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Macroeconomic Adjustment and Growth

Country Economics Department
The World Bank
March 1991
WPS 633

The Macroeconomics of the Public Sector Deficit

The Case of Thailand

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and
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Thailand's pattern of public expenditure finance — relying more on tax revenues and commercial and private borrowing, and less on central bank loans and money financing — has contributed to Thailand's macroeconomic stability. This year, the government proposes a balanced budget, after three years of fiscal surplus.

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This paper — a product of the Macroeconomic Adjustment and Growth Division, Country Economics Department — is part of a PRE research project, The Macroeconomics of the Public Sector Deficit (RPO 675-31). Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Raquel Luz, room N11-057, extension 34303 (73 pages).

In the past, the Thai government usually ran a budget deficit. In recent years, the deficit has become a surplus. A continued high growth rate in the last three years produced an unexpected rise in tax revenues, and the growth of public spending was effectively controlled. The government has adopted an early retirement plan for foreign debts and in fiscal 1991, for the first time in recent history, the government proposes to balance the budget.

The central government's actual spending is usually below planned spending — which is overestimated during slumps and underestimated during booms. Tax capacity has increased gradually over time relative to GDP. This factor has contributed most to reducing the public deficit. There have also been more automatic stabilizers and a decline in dependence on foreign trade tax.

Thailand's pattern of deficit finance has contributed to macroeconomic stability. In times of high deficit, the government relies less on borrowing from the central bank and more on borrowing from commercial banks and the private sector. Money-financed deficits are more likely to exacerbate inflation and the current account deficit than any other method of deficit financing. The strong growth of the Thai economy is attributable partly to appropriate fiscal responses to external shocks. Stable prices helped facilitate the depreciation of the real effective exchange rate, further strengthening export and output growth.

Produced by the PRE Dissemination Center

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1. INTRODUCTION

This paper examines the causes and the consequences of Thailand's public deficit. The changing structure of public expenditures and public revenues will be presented. In the past, the Thai government usually ran a budget deficit. However, the public deficit turned into a surplus in recent years. In the 1991 fiscal year, the government has proposed a balanced budget for the first time. We would explore the reason for the turnaround of the fiscal position of the Thai government. The focus will be made on the consequences of public deficit on macroeconomic variables.

The organization of the paper is as follows. Section 2 provides the historical background of the macroeconomic performances of the Thai economy. The structure and the characteristics of public deficit of the Thai government will be examined, together with the institutional background on law and regulations on the size of public deficit and external debt. In section 3, decomposition of the public sector deficit is presented to evaluate the sensitivity of the deficit with respect to external factors, domestic macro variables, and policy variables. Section 4 explores the implications of domestic financing of the deficit, in particular the inflationary effects of money financing budget deficit. Section 5 contains the results from partial equilibrium analysis of the direct and indirect effects of public deficit on investment and consumption. Section 6 identifies the impact of public deficit on real exchange rate and trade deficit. Section 7 discusses the specification and the estimation results of the macroeconometric model that will be used to examine the consequences of the budget deficit. Counterfactual simulations of various methods of financing the deficit are conducted in Section 8. The concluding observations on the implication of the deficit, its structure and its method of financing on macroeconomic variables are made in the last section of the paper. The appendix contains the list of variables and the estimation results of the model.

2. HISTORICAL BACKGROUND

2.1 The Macroeconomic Performance of the Thai economy

The Thai economy continued to grow rapidly between 1971 and 1989 as result of the expansion in domestic investment and exports. The real GDP growth rate averaged 7.1 percent during this period. As can be seen from Figure 1, the real growth rate was always positive even during the periods of external shocks. The positive shock in 1973, due to commodity export boom, led to higher growth and inflation rates. The negative shocks in 1974

and 1980 led to lower growth and higher inflation rates. The internal shock--the military coup--in 1981 further aggravated the growth performance in 1982

Aside from those years affected by the shocks, the Thai economy remained buoyant with a high degree of price stability. The average inflation rate throughout the period was 7.2 percent. If the external shocks in 1973, 1974, and 1980 were excluded, inflation averaged only 4.9 percent. It should be noted that inflation rate in Thailand is a one-shot inflation type, rather than spiral inflation. The price level rose rapidly as the result of the shocks and remained rather stable in subsequent period. After 1975 and 1982, the economy was able to expand at a faster rate than the inflation rate, thus regaining the pre-shock growth path within a few years after the shocks. From 1981 to 1984, the inflation rate was on a declining trend, while output also expanded at a positive rate. Since 1985, the inflation rate has resumed its momentum, output also expanded rapidly.

The rapid growth must be supported by domestic and foreign savings. The investment-saving gap became wider as can be seen from figure 2, illustrating a reflection of the investment gap in terms of the trade deficit as percentage of GDP. The trade balance was always in deficit. Thanks to foreign capital inflows, the balance of payments was in surplus after 1984, resulting in the rapidly expanding foreign international reserves in recent years. Nevertheless, the deficit in the balance of payments occurred in 1978 and 1983. This was the period which required some adjustments in macroeconomic policies. We are now asking an important question: To what extent fiscal policy, or public deficit in particular, contribute to the successful performance of the Thai economy?

2.2 Fiscal Structure

The deficit of the consolidated public sector was larger than the central government deficit, due to the deficit budget of public enterprises. Nevertheless, the movement of the consolidated deficits was determined mainly by the deficit in the central government budget. Except in 1974, 1988, and 1989 when surplus in central government balance occurred, the budget was usually in deficit. The highest level reached 8.6 percent of GDP in 1985, the year in which the growth rate fell to 3.5 percent.

Considerable efforts were made to lower the size of the deficit after 1985. As shown in Figure 3, the relative size of the public sector in GDP was reduced remarkably from 23 percent in 1985 to 16.6 percent in 1988. During the corresponding period, the revenue as a percentage of GDP was enhanced from 14.6 to 16.8 percent. Consequently, the public sector deficit was converted into surplus in 1988.

Table 1 indicates the changing structure of public expenditures from 1970 to 1989. The slowdown in the growth rate of public

expenditure in the period 1986-89 was the result of the reduction in spending growth rates of both current & capital expenditures. Since the cut was made more from capital expenditure, its share in total expenditure was reduced. Fiscal spending structure was altered by reducing public capital accumulation. This implies that the role of public sector as providing infrastructure to accommodate private investment will be diminished. Since the share of expenditure on infrastructure in total public expenditure is low, averaging 21 percent during 1975-1985, the effect on private investment of reducing the size of public sector is favorable by reducing crowding-out effect. reducing . In some countries, it was very difficult to cut down public investment and this was a source of run-away budget deficit in many LDCs during external shocks (Tanzi, 1986). The variation of public expenditures suggests the flexibility of the discretionary fiscal policy. The government was able to slow down or speed up the growth of public expenditures, thereby exerting some control over the size of the deficit.

In terms of major functional classification, the slowdown in central government expenditure growth was achieved through reducing the share of budget allocated for economic services. The growth rate of defense spending was cut considerably from 18 percent in the period 1975-85 to only 2.7 percent in the period 1986-89.

Figure 4 presents the consolidated non-financial public sector expenditure as percentage of GDP. The interest payments rose from 0.26 percent in 1970 to the highest level of 1.9 percent in 1986. The expenditure on wages remained relatively stable around 5.72 percent of GDP, while expenditures on fixed investment and goods and services averaged 7.1 and 4.6 percent, respectively

On the revenue side of the central government, as reported Table 2, the share of income tax revenues in total taxation has increased from 13.5 percent in the period 1971-74 to 21.6 percent in the period 1986-89. During the same corresponding period, the share of sales taxes rose from 19.6 to 27.5 percent, while the importance of import duties has diminished over time. Its share reduced from 27.7 percent to 22.4 percent. The growth rate of different components of tax revenue in Table 2 also suggests that indirect tax revenue might be responsive to rapid economic growth experienced in the period 1986-89.

The government revenues as a proportion of the GDP increased gradually over the last two decades, from 13.1 percent in 1970 to 15.3 percent in 1989. Figure 5 illustrates the tax revenue structure as percent of GDP.

The values of expenditure elasticities and tax buoyancy are provided in Table 3. The elasticities of public expenditures are obtained from regression equations explaining public expenditures by the one-period lagged public revenues and the previous period public expenditures. The figures in parentheses indicate the long run elasticities. It is found that both short-run public

consumption and investment elasticities are less than unity, suggesting that public expenditures were constrained by public revenues. The long-run value of the elasticity of total public expenditures was close to unity, indicating the stationary level of the deficit in the long run.

The values of tax buoyancy were obtained from the regression coefficients derived from regressing various tax revenues on tax bases indicated in Table 3. It is found that, except for import duties, both direct and indirect tax buoyancy are elastic with respect to personal income and domestic absorption, respectively. It suggests an important role played by the fiscal built-in stabilizers. As implied by the values of the tax buoyancy Table 3, the revenues from income and business taxes became increasingly important, as shown by their rising shares in GDP in Figure 5.

2.3 Regulations on public deficit

The government planned to reduce the size of the deficit (as measured by a percentage of the revenue) since 1978. The General Prem government determined to strictly maintain the conservative fiscal policy, trying to control the size of the deficit. The government had a tendency to overestimate public expenditures. The actual amount of public spending was usually lower than the planned level. On the other hand, the revenue was underestimated during the economic boom period, while it was overestimated during the economic slump. As a result, as shown in Figure 6, the actual level of public deficit was smaller (larger) than the intended level of deficit under the economic expansion (slowdown). Thus, given the level of public expenditure, the actual size of the deficit was altered as a stabilizing fiscal measure.

Budgetary Law

The budgetary law in 1959 stipulated the deficit must not exceed 20 percent of the government expenditure. In 1974, the budgetary law was relaxed to accommodate the expenditure on principal repayments. According to the revised budgetary law, the size of the deficit must not exceed 20 percent of the proposed level of public expenditures plus 80 percent of the proposed budget allocated to principal repayments. As a result, the size of the deficit itself is constrained by the size of the public revenue.

The implication of the budgetary law is that the level of the proposed spending cannot exceed 25 percent of the level of estimated revenue (G-R <.2*G, or G < 1.25*R). This rule has a fundamental effect on the ability to control the size of the deficit Table 4 elucidates this point. The estimated or the proposed expenditure (Ge) were usually less than the actual spending (Ga). On the other hand, the estimated revenue (Re) was either higher or lower than the actual revenue, depending on the

accuracy of the forecasts on economic activity.

The planned level of public expenditure as percentage of the maximum level permitted by budgetary law declined sharply after 1977. During the Prem regime, the planned level of public expenditure was on average 90 percent of the maximum permitted level. After the budgetary law was revised in 1974, the ceiling on the deficit became a binding constraint on the level of proposed spending. As indicated in the last column of Table 4, the actual level of public expenditures was well below the maximum level permitted by the budgetary law. Although the period 1975-1985 was during the time when the government accelerated the public spending, the increased spending never exceeded the limit, ranging from 84 to 98 percent of the maximum amount.

Debt-service ratio and foreign debt ceiling

Regulation on foreign borrowing was made in 1960 by setting the ceiling on debt-service ratio at 5 percent. In addition, foreign debt services must be less than 13 percent of planned revenue. The foreign debt policy commission was also set up in 1960 to monitor and regulate foreign borrowing. The debt-service ratio and foreign debt service to planned revenue ratio were revised upward gradually in subsequent years to allow the government to finance its capital expenditure. In 1977, foreign debt policy commission was empowered to control public enterprises' foreign borrowing. In 1981, the ministry of finance was empowered to negotiate foreign loans for military procurement. The debt-service ratio was raised temporarily from 9 to 11 percent for the period 1984-1987 to accommodate refinancing program. The actual value of public debt service ratio as compared with the ceiling was presented in Figure 7. The debt service ratio declined after 1985 when the government realized the heavy burden of external debt. In 1986, the government was determined to reduce foreign debt by setting a one billion US dollars maximum amount of foreign borrowing within one year. This maximum amount was later raised to 1.2 billion US dollars in 1989.

3. DECOMPOSITION OF THE PUBLIC DEFICIT

An analysis of the effects of public deficit on domestic macro variables will be discussed in subsequent sections by employing a small macroeconometric model. Since the size of the public deficit is in turn affected by the changing macroeconomic variables, from the partial equilibrium analysis, it is possible to identity some of the feedback effects of the domestic macro variable by using a single regression equation. In this section, the size of the consolidated public deficit will be decomposed into domestic macro variables, foreign variables, and policy variables.

The contributions to the deficit of various variables will be

measured by their statistical significance in the regression equation which explains the deviation of consolidated public sector deficit from the value in the base period. The regressors in the equation are also in the form of the deviation from their base values. For domestic variables, we include the domestic interest rate, real exchange rate, inflation rate. The terms of trade and the foreign interest rate are chosen. Taxation rate, fiscal structure variable, or the ratio of public investment to public consumption are employed. Some variables are omitted due to multicollinearity. The best result is presented in Regression 1.

The result indicates that the terms of trade (PXM), and the tax ratio (TY) have a significant negative impact on the size of the deficit, while inflation rate (INF) has a positive impact. The real exchange rate variable (PTN) is not statistically significant. An improvement in the terms of trade would stimulate the economy and indirectly increase the revenue, thereby reducing the size of the deficit. Given the level of income, an increase in the tax ratio, which reflects increasing tax effort, implies a reduction in the public deficit. The only factor that contributes to higher deficit in the partial equilibrium analysis is inflation rate. The significant positive coefficient of the inflation variable in Regression 1 implies that inflation raises the level of public deficit. A plausible explanation for this result is the Tanzi effect, which reduces the real value of tax revenue which increased inflation. On the other hand, public expenditure may rise faster than the public revenue.

The decomposition of the change in consolidated non-financial public sector deficits, according to the contributions of variables in Regression 1, is presented in Table 5. The changes due to other factors usually reduced the size of the deficit. The effects of these unidentified factors are prominent in 1973, 1974, and 1979, during which the external shocks occurred. The deterioration in the terms of trade consistently gave rise to public deficit. On the other hand, from 1977 to 1988, the contribution of tax policy variable led to a considerable reduction in the public deficit. By comparing the magnitudes of the contribution to GDP ratio in Table 5, it is evident that the tax policy variable is the most important factor contributing to the reduction in the public deficit in recent years.

The sensitivity of the public deficit due to changes in explanatory variables from Regression 1 is reported in Table 6. Again we found that the public deficit is very sensitive to changes in the tax policy variable. The sensitivity of the public deficit due to changes in external terms of trade is also large. A negative shock would imply a considerable deterioration in the fiscal position. This finding has an important policy implication on the appropriate strategy of fiscal policy during external shocks. Inflation, which tends to enlarge the public deficit, has a small effect on the deficit, as indicated by the low value of the semi-elasticity. It is possible that inflation

raises both revenue and expenditure so that the two effects offset each other.

We now turn to the next section, where the relationship between inflation and the deficit financing is discussed.

4. IMPLICATION OF DOMESTIC FINANCING THE DEFICIT

After 1977 the government attempted to reduce the size of budget deficit from 1979 to 1983. As shown in Figure 6, the size of the planned deficit as percentage of revenue reduced substantially from 26.6 percent in 1977 to only 13 percent 1983. Not only that the excess of expenditure over revenue was reduced, the method of financing the deficit was also altered. Table 7 indicates that non-inflationary means of deficit financing was adopted. More heavily reliance on domestic borrowing was made, rather than using treasury cash balance. From 1970 to 1977, the share of cash balance utilization was on average 18.3 percent, as opposed to only 2 percent during 1978 and 1988. It should be noted that the share of borrowing from abroad to finance public deficit was insignificant. Therefore it is not surprising that the effect of the change in foreign interest rate has no direct significant impact on public deficit. Therefore, the foreign interest rate is excluded from the decomposition analysis in Table 5.

The share of borrowing from the Bank of Thailand was reduced from 60.1 to 38.1 percent during the same period. High-powered money financing method was substituted by borrowing from commercial banks, government savings bank, and the private sector through bond-financing method. In particular, the average share of borrowing from the private sector in net domestic borrowing increased from 8.2 to 16.7 percent. Thus, since 1987, the government reduced both the size of the deficit and the reliance on money financing budget deficit.

The relationship between seigniorage and inflation rate is shown in Figure 8. It is evident that the annual increase in monetary base is relatively low, ranging from 0.4 to 1.8 percent of GDP. Moreover, there is no clear relationship between inflation and seigniorage. High inflation years such as in 1973, 1974, and 1979 are associated with external shocks. Nevertheless, we can further explore the relationship between the demand for money and inflation rate.

In regression 2 and 3, the inverse of the velocity, or the money to income ratio, is explained by inflation rate. Here, we found the positive relationship between inflation and the velocities for both M1 and M2. The estimated coefficients of the inflation rate has an implication on money financing deficit. The inverse of the coefficient gives us the maximum amount of inflation tax revenue from printing money. The long-run coefficients of the inflation rate are employed to generate the paths of seigniorage revenues as percent of GDP at various rate of inflation. This relationship is illustrated for both M1 and M2 in Figure 9.

Since the demand for money of the private sector is very responsive to the inflation rate, it is very difficult for the government to employ inflation tax. If inflation rate is higher, the velocity will also increase. As a result, the optimum rate of inflation at which the government can maximize the tax revenue will be between 4 percent to 11 percent, for M1 and M2, respectively. This finding is consistent with the evidence shown in Figure 8.

5. EFFECTS OF PUBLIC DEFICIT ON PRIVATE INVESTMENT AND CONSUMPTION

In order to identify direct and indirect effects of fiscal deficit on private investment and consumption, we employ a single equation regression analysis. In Regression 4, private consumption in real terms is regressed on real income, interest rate, fiscal structure (ratio of public investment to consumption), liquid wealth in real terms (beginning period stock of broad money), public deficit (total expenditure to tax revenue ratio), stock of public debt in real terms, and inflation rate.

The regression result does not indicate any direct effect of public deficit on private consumption. However, the indirect effect as captured by real income, interest rate, and inflation rate are significant. The insignificant coefficient of the policy variables can be attributed to the correlation between these variables and the indirect factors. Therefore, we can not distinguish appropriately between the direct and indirect effects of the public deficit, since the variables that are intended to capture the indirect effects are also affected by the public deficit in the same equation.

We may conclude that if public deficit stimulates the economic expansion, according to the conventional belief, it will have an indirect effect on consumption thorough income variable via multiplier effect. On the other hand if inflation is caused by higher level of deficit, private consumption will be reduced. In other words, private savings will increase to offset the deficit of the public sector. However, this does not confirm Ricardian Equivalence hypothesis, since the deficit that raises the interest rate will also induce higher consumption, according to Regression 4. Admittedly, the positive effect of interest rate on consumption is difficult to explain unless we assume that the income effect dominates the substitution effect.

The effect of public deficit private investment is examined in a similar manner. Regression 5 reports the result from regressing private investment on the change in income level, the rate of interest, the fiscal structure, capital stock, the public deficit, and inflation rate. It is found that public deficit reduces the level of private investment. The variables on inflation rate, output growth, and the rate of interest are not statistically significant. However, the fiscal structure variable is significant and positively related to private

investment level. This finding suggests that public investment may be complementary to private investment. Given the size of public deficit, favorable effect on private investment can be obtained if the public spending structure is bias toward infrastructure. On the other hand, the crowding-out effect of public deficit can be diminished if the spending structure is altered toward capital rather than current expenditure.

In conclusion the effect of public deficit is clearly negative for private investment, not consumption. While spending structure of the public sector has no significant effect on private consumption, it does matter for private investment.

6. IMPACTS OF PUBLIC DEFICIT ON REAL EXCHANGE RATE AND TRADE DEFICIT

The real exchange rate which is the relative prices between tradables and non-tradables. The price of the latter is constructed from the calculated price index of several sectors such as banking, ownership and dwellings, public administration and services, and service sector. The price of tradables is then calculated from the GDP deflator by taking into account the share of value added in GDP from non-tradable sector. The results are shown in Table 8.

As illustrated in Figure 10, the real exchange rate appreciated substantially between 1979 and 1985, except for a short break in 1981. In Table 5, where decomposition of the public deficit is made, we have shown that the real exchange rate has a negative impact on the public deficit. However, the relationship between public deficit and the real exchange rate might be simultaneous.

If the public deficit increases, given a fiscal structure of public spending, the effects on the prices of tradables and non-tradables will be different. The prices of tradable goods are mainly determined by external prices, while the price of non-tradables will be determined mainly by domestic conditions. An increase in the level of public deficit will lead to a more proportionate increase in non-tradable price than tradable prices. As a result, the real exchange rate will appreciate when the deficit increases. The negative relationship between the two variables can be easily seen in Figure 10, where the deviation from 1980 values of real exchange rate and public deficit are presented.

If the spending structure of the government can also affect the real exchange rate, since higher capital spending relative to consumption implies less pressure on the price of non-tradables. The government consumption expenditures will most likely to fall upon non-tradable goods market rather than tradable goods market. We expect that rising share of public investment relative to public consumption would lead to a depreciation in the real exchange rate.

The terms of trade, which is the relative prices of exports to imports, also affect the real exchange rate, because a given change in the price of exportables and importables will affect the prices of tradable and non-tradables differently. Moreover, the import content of the tradables is larger than that of non-tradable goods.

The statistical relationship between the real exchange rate and the terms of trade, the government deficit, the trade balance deficit, and the fiscal structure are shown in Regression 6. The one-period lag variable of the real exchange rate is included, suggesting the existence of the disequilibrium price adjustment. We find that the negative relationship between the real exchange rate and the public deficit (represented as the ratio of expenditure to revenue) is confirmed. Although the trade deficit variable is not statistically significant, its impact on the real exchange rate might be difficult to separate from other variables in the equation, due to multicollinearity. The terms of trade has a positive effect on the real exchange rate. A favorable shock in the terms of trade leads to a depreciation in the real exchange rate.

In Regression 7, we examine the impact on trade deficit of the public sector deficit, the prices of exportables and importables relative to non-tradable goods prices, the fiscal structure, and domestic income level. There is no clear evidence which indicates that public deficit causes a deterioration of the trade balance.

There remains large unexplained variations of the trade deficit. The only significant variables are fiscal structure and income level. The former causes a widening trade deficit, the latter reduces it. One would expect that an increase in income level will increase imports and raise the trade deficit. The difficulty with the single equation partial equilibrium analysis is the fact that the right-hand variables may not be truly exogenous. Without using the simultaneous system, one can hardly quantify the true effect of the interrelated macrovariables on the trade balance.

7. A MACROECONOMETRIC MODEL AND ESTIMATION RESULTS

In partial equilibrium analysis, spillovers between sectors are largely ignored. In regression 4 and 5, the analysis is made to capture the effects of the public deficit on consumption and investment. This is done by assuming that there is no feedback effects of the changes in consumption and investment to the level of public deficit. It is important to broaden the scope of the analysis to understand how the equilibrium is achieved in all markets simultaneously. When the private spending is changed, national income, imports, and the price level will be affected. As a result, all macro variables will be affected. The net effects of the public deficit can be examined by utilizing a small macroeconometric model.

The model consists of 45 equations, 28 of which are behavioral and 17 of which are identities. The complete model specification is shown in Table 9. The lists of endogenous and exogenous variables in the model are shown Tables 14 and 15 in Appendix A.

The simultaneous relationships among variables in the real sector are demonstrated through the national income identity, where income level comprises of private and public spending. In turn, under the hypothesis that private aggregate spending depends on permanent income, thus income level also affects private spending level simultaneously. The interlink between the real sector and the monetary sector is made via the credit availability effect in the investment function and via the income effect on the demand for financial assets. For the price level, it is determined by external influences and the excess demand conditions in the domestic market.

The real sector of the model was estimated by the instrumental variable method. For the private portfolio and the bank portfolio blocks, the Seemingly Unrelated Regression method was employed to improve the efficiency of parameter estimates. The Cochran-Orcutt iterative technique was utilized whenever an autocorrelation was detected. Annual data were employed from 1970-1987. Sources of data were the National Economic and Social Development Board, the Bank of Thailand, and the IMF International Financial Statistics. Results of Estimation are provided in Appendix B.

The Trade Sector

Thailand is considered as a price taker in the world market. On both imports and exports, the small country assumption was adopted.[1/] Thus, only the demand equations for imports and the export supply equations are included in the model. Export commodities are separated into agricultural and industrial products. The prices of agricultural exports and industrial products are determined by the world price levels. The demand for merchandise imports are classified into three categories: agricultural products, industrial products, and petroleum products.

The quantity of agricultural exports supplied depends on its previous year's net export price reflecting the lag adjustment pattern of agricultural production. Nevertheless, the current domestic price of agricultural products is also included, indicating the possibility for exporters to choose between supplying to foreign or domestic markets. The substitution is made, not between supplying to export markets and non-tradable sector, but between supplying to export markets and domestic

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1/ Although Thailand affects the world export prices of rice and cassava, their share in Thailand's total exports reduced continuously from 25 percent in 1970 to only 13 percent in 1989.

market. Therefore, the real exchange rate, or the relative price of exportables to non-tradable prices are not relevant in this equation, since we are disaggregating exportables into different categories of exports. The effective exchange rate should then be employed, since it affects the decision whether to supply at home or abroad. There are both theoretical and empirical justification for including the effective exchange rate in the exports and import functions.

Furthermore, the homogeneity assumption embodied in the price ratio variables in imports and exports equations have long been questioned by various authors [Haynes and Stone (1983), Wilson and Takacs (1979)]. The weakness of this assumption is that it contains the influence of the two price variables to be equal in magnitude but opposite in sign (Murray and Ginman, 1976). In the study of import demand and export demand functions of 19 industrial countries, Warner and Kreinin (1983) found that it is not justified to employ a composite relative price variable; separation into its components yields more accurate results, because import and export unit value indexes and domestic wholesale price index are constructed with different weights, and usually different formulas, the homogeneity constraint would be inappropriate in practice. In this paper, we choose to test the propriety of the homogeneity constraint by separating the composite relative prices.

The quantity of agricultural exports supplied varies in the opposite direction of the change in the current domestic price level of agricultural products. Furthermore, the one year lag of the quantity of agricultural exports supplied is also included as an explanatory variable to capture disequilibrium quantity adjustment.

The share of agricultural products in GDP was first introduced in the agricultural exports supply equation to capture the output capacity, but the negative correlation was observed. The reason comes from the changing structure of the Thai economy. While the share of agricultural products in GDP is declining as Thailand approaches a NIC status, the export values of agricultural products are still increasing.

Instead, the agricultural export production capacity in this sector is represented by the aggregated value added of agricultural products and the value added of the remaining sectors excluding industry and services. While the former is endogenously determined from the production function in the model, the latter is an exogenous variable, representing the effect of the expanding role of the government in providing basic infrastructure facilitating the production, transportation, and marketing of agriculture products.

Unlike the agricultural exports supply equation, the production capacity is represented by the share of industrial products in GDP. It should be noted that the high value of the estimated

coefficient of the share of industrial product variable suggests that the changing structure of the economy cause a massive contribution to the rapid growth of industrial exports. Since industrial exports may affect the share of industrial production in GDP, the lagged value of industrial share was employed in the estimated equation.

The movement of the current account is captured by endogenizing the exports and imports of services. Since the main component of export services is travel receipts, the quantity demanded for export services would depend on real world income (in baht). In addition, a dummy variable for 1980-1987 is added to capture a period of dramatic increase in the number of foreign tourists.

Imports of services depend on the total trade volume, since freight, and insurance expenses tend to grow with the quantity of merchandise imports and exports. Two dummy variables are added into the service imports equation. The first dummy captures the 1973 and 1984 period of a reduction in import services due to tight monetary control. The second dummy capture the positive impact on imports of services due to the oil price shocks in 1979 and 1980.

The specification of the three merchandise demand for imports are quite similar. Included in the import demand functions are their own price variables (in baht currency) with their corresponding tariff rates, their domestic competing product prices, the real income trend, and the ratio of actual real income to trend real income. The motivation for including the last variable is to capture the impact of the real growth rate on the quantity import demanded (Khan and Rose, 1975). Thus, the income elasticity is not constant, but it is able to vary whenever actual income deviates from the trend income.

The lagged dependent variable was initially included in the three merchandise import demand equations to allow disequilibrium adjustments. However, only the import demand for agricultural products attains a satisfactory level of significance. Thus, this variable is excluded from the other two import equations.

The obtained values of the import and domestic price elasticities of import demand for agricultural imports and industrial products are in different magnitudes. It clearly suggests that it is inappropriate to force the homogeneity assumption. Except for the petroleum products, whose domestic and import price indexes are not subject to aggregation problem, it is obvious that the same percentage increase in import price and domestic price of the competing products will lead to a different responsiveness of imports.

All import price elasticities are less than unity, suggesting the difficulty of finding the product substitutes. The import demand for petroleum products is the least elastic. The effects of the oil price shock on the current account will be substantial.

The estimated results show that the elasticity of income trend variable is greater than unity for both agricultural and manufactured imports. It suggests that the quantity demanded for these kinds of imports is sensitive to the trend income growth rate. Furthermore, the coefficients of the ratio of actual income to trend income variable are high, especially in the demand for petroleum imports. The deviation from income trend elasticities import demand for agricultural, manufactured, and petroleum products are 1.25, 1.85, and 3.39, respectively. As mentioned earlier, it means that there will be a substantial increase in the quantity demanded for imports during economic boom. This finding has a policy implication on the stabilization policy: contractionary policy will be very effective in reducing the current account deficit.

Aggregate demand and supply

It has been argued that an appropriate econometric model for developing countries should focus on the supply rather than the Keynesian demand determined model. The first two equations in this block represent the production functions of the economy. The aggregate production is decomposed into two products: agricultural and industrial products. Both equations depend upon the amounts of corresponding capital stocks, the real import values of petroleum products, and the number of labor employed in the corresponding sector. It should be noted that our model explicitly links the international transmission disturbances with domestic supply via the petroleum imported inputs.

On the aggregate demand components, private consumption expenditures depend on real disposable income and consumption of the previous period. The lagged variable reflects either the effect of persistent habit or distributed income lags, according to the permanent income hypothesis. The estimated short-run and long-run income elasticities are 0.47 and 0.96, respectively. Thus the impact of a change in current income on current consumption is significantly different from the long-run effect. The specification of the consumption function in equation (10) still maintains the indirect effects of public deficit since both income and price variables are included.

If the interest rate is controlled, credit rationing is unavoidable. Credit rationing is now regarded as an important part of the transmission mechanism of for monetary policy. But credit is likely to be rationed even without interest control or with perfect capital mobility. Stiglitz and Weiss (1981) argued that because the asymmetric information under uncertainty between lenders and borrowers, credit rationing is likely to occur, and the interest rate will not clear the market. In the MIT-Penn-SSRC model, monetary policy affects the credit availability and thus the volume of investment without necessarily affecting the interest rate. The interest rate variable has been tried in the investment equation (Regression 5). It has a positive sign and statistically insignificant. It is argued here that, regardless

of the degree of capital mobility, investment is affected by the additional quantity of bank credit as long as the rate of interest does not clear the market. Tobin (1978) has also emphasized the importance of the credit availability effect of monetary policy.

Private investment behavior is explained by the flexible accelerator hypothesis. The speed of adjustment between the actual and the desired level of capital stock varies according to the size of the additional bank credit relative to the gap between the desired and actual level of capital stock. The credit availability effect is the important channel linking the real and financial sector in this model. In addition, adjustment of the actual capital stock to the desired level is made faster with the additional amount of domestic money supply and foreign capital inflows. Thus money financing deficit will affect the domestic investment in a similar manner with the bond financing deficit, if the latter raises domestic rate of interest and induces more capital inflow.

The estimation results from equation (11) indicate that there is a significant relationship between investment and the availability of loanable funds from the government-issued money, bank credit, and foreign savings. The output elasticity of the demand for capital stock is greater than one, indicating that private investment responds vigorously to the expansion of output.

Government revenue function is estimated in equation (12). It depends on aggregate imports and real domestic absorption through import tariff revenues and indirect taxes. The lagged endogenous variable included in the tax function captures the effect of lag revenue collection.

The Price Block

The approach taken in this block is to model the determination of the rate of change in GDP deflator. After that we can link the GDP deflator with domestic prices of agricultural and industrial products. The identity (45), explaining the domestic price of the remaining sector, i.e., public utilities and services, is imposed to comply with the homogeneity condition. It is argued here that the inflation rate in Thailand is determined by both internal and external impulses. Inflation is directly related to the demand pressure variable, which is the internal impulse represented by the Okun gap, i.e., the ratio of the level of aggregate demand to the capacity output. External sources of inflation originate from imported inflation and export demand pressure via changes in agricultural product prices. All estimated coefficients of the explanatory variables give the expected signs with high level of significance. Although the rate of change in money supply does not appear in the inflation equation, it by no means denies the fundamental proposition of the monetarist. In this model the effect of monetary impulse

exerts its influence on the aggregate demand through the rate of change of bank credit in the investment function.

The domestic price level (GDP deflator) determines domestic agricultural and industrial product prices. It should be noted that the estimated coefficients of the GDP deflator in equations (14) and (15) are not significantly different from unity. This implies that these two prices, including the domestic prices of service and utilities, which is determined by identity (45) move proportionately in the long run, which is the result of the constant weighting index system.

The domestic agricultural and industrial product prices in turn enter the corresponding import demand functions, allowing the substitution effects to take place between domestic and import products. The relationship between the aggregate import price index and its three desegregate components are shown in the last equation of the price block.

The financial Block

The interest rate and capital flows

There are three behavioral equations in this block: The loan demand, the foreign capital inflows, and the net foreign assets equations. The demand for loan equation and the loan supply equation shown in the bank portfolio sub-section simultaneously determine the commercial banks' lending interest rate and the amount of bank credit. The demand for loan depends negatively on the bank lending rate and positively on the foreign interest rate and the ceiling lending rate regulated by the Bank of Thailand.

An increase in the foreign interest rate will lead to a higher demand for domestic credit due to a negative substitution effect. On the other hand, an increase in the ceiling rate, when the ceiling rate is binding, permits commercial banks to adjust lending rate to the equilibrium level, thereby allowing the volume of bank credit to increase. The lagged interest rate level reflects the lagged adjustment of the domestic interest rate to the new equilibrium level.

Net capital inflows, as specified in equation (18) depend on activities at home and abroad: interest rates, the exchange rate, price levels, and foreign income level, proxied by the level of industrial production in developed countries. The theoretical justification of this equation is provided by Niehans (1984). Again, it is not necessary to force the homogeneity condition for the price level. As the estimated results show, there is a marked difference between the coefficients of the absolute price level. Separating the composite price ratio into exchange rate, and absolute price level allows us to test the appropriateness of the homogeneity assumption.

The signs of the estimated coefficients indicate that an increase

in the levels of industrial production in industrial countries, domestic interest lending rate, foreign and domestic prices of industrial products will lead to an increase in net capital inflow. On the other hand, net capital inflows are reduced as a result of the increase in the foreign interest rate. However, for a given equal percentage increase in domestic and foreign interest rates, there would be a net foreign capital inflows, for net capital inflows is more elastic to domestic interest rate than the foreign interest rate. It might be easier to bring the money in than to take the money out. This suggests that the capital mobility is far from perfect. The domestic interest rate is usually above the foreign interest rate. In addition to country risk and foreign exchange rate risk, the withholding tax on the interests paid to foreign borrowing obstructs the capital mobility. The withholding tax was employed frequently in the past to control capital account. To stimulate capital inflows, the government would temporarily abandon the tax rate. To prevent the influx of the capital inflows, the government would reimpose the withholding tax rate. In addition, sterilization of capital inflows was made in order to conduct the monetarist school policy.

Depreciation of the effective exchange rate stimulates excessive foreign borrowing. Net capital inflows consist of the capital movements via portfolio investments and long-term direct foreign investment. The rise in foreign price level indicates induced capital inflow due to comparative cost advantage of producing the same product in Thailand. The estimated coefficient of the domestic price variable shows a positive sign with insignificant level.

Net foreign assets in baht (equation 19) depend on foreign capital inflows, the size of the current account deficits, and the exchange rate of the baht vis-a-vis other currencies. Alternative specification was made in the form of identity. However, the simulation errors are substantial relative to the functional specification, suggesting that there might be some unaccountable items due to capital outflows, which can be more appropriately captured by a behavioral equation.

The estimated coefficients in the net foreign assets equation have expected signs. The impact of the current accounts deficits on the level of net foreign assets is clearly shown by its statistical significance. These results imply that the central bank can control only some portions of the monetary base. The dummy variable captures the unusual increase in net foreign asset in 1987.

The Private Portfolio Block

Portfolio allocations of the private sector can be explained in the following manner. First, the private sector chooses between holding interest-yielding financial assets (Z) and non-interest yielding financial assets such as demand deposits and cash. The

variable Z includes saving deposits, time deposits, and government bonds. The demand for these interest rate yielding assets and demand deposits are assumed to be homogeneous in nominal income. Thus, demand for these assets will change proportionately with the change in nominal income.

The allocation of Z and demand deposits will depend on the rate of return on Z, which is the weighted average of the rates of interest, and the cost of holding financial assets, i.e. inflation rate. As the regression results indicated in equations (21) and (22), the rate of return on Z has a negative impact on demand deposits and a positive impact on the aggregate interest-yielding assets. Inflation rate causes a reduction in the demand for financial assets. The negative impact of inflation is stronger in the case of interest-yielding financial assets than in the case of demand deposits.

Once the quantity of interest-yielding aggregated assets is determined, the portfolio allocation into time deposits, saving deposits, and government bonds can be determined. The latter variable is determined by identity, according to the adding-up constraint. The shares of time deposits and saving deposits can be determined by equations (23) and (24), which indicate that all relevant rates of return in this set of portfolio are included. Lagged endogenous variables are included to allow disequilibrium stock adjustment. The estimation results obtained by the seemingly unrelated regression improved substantially over the results obtained by the OLS method. The estimated coefficients of the own rate of return variables and the cross-rate of return have the expected signs.

The Bank Portfolio Block

The total deposits of commercial banks are determined by the private sector portfolio allocation. The total deposits are demand determined, constituting domestic sources of available funds. However, commercial banks can choose to expand their activities by enlarging their portfolio size through foreign borrowing. Commercial banks' foreign liabilities are hypothesized to depend on their lending volume, available domestic resources, the relative cost of borrowing from either the central bank (discount rate) or from abroad (foreign interest rate). The estimated results are shown in equation (25). The estimated elasticities indicate that foreign borrowing will increase more rapidly than the increase in domestic lending. Another important finding is that the rediscount rate of the central bank can be used to stimulate or discourage foreign borrowing of commercial banks. Since foreign interest rate affects available financial resources of commercial banks, this equation serves as an international linkage between domestic and international money markets.

Once the available financial resources are determined, commercial banks decide how to allocate their portfolio into government

bonds (GBb), foreign assets (Fa), cash and reserves (CAb), and loans (L). Since the rates of interest of these assets tend to move by the same direction, multicollinearity problem is encountered in estimating bank portfolio equations. In addition, there are some regulations on bank portfolio. For example, commercial banks must hold government bonds up to a certain percentage in order to be allowed to increase the number of their branches. Not all of these rates of return are included in the estimating equations in this block. The estimation results are shown in equations (26)-(28).

The Identities

The identities consist of definitional equations. They comprise the following items: monetary base (B), total deposits of commercial banks (D), notes in circulation (CAp), which is the balance sheet of the Bank of Thailand, the government bonds held by non-bank private sector (GBp), which is the difference between total interest-yielded financial assets (Z) and time and saving deposits. The balance sheet of commercial banks is imposed by specifying identity (33), relating commercial banks' borrowing from the central bank (Hb). Other identities include aggregate exports and imports, trade balance and current account balance, domestic absorption (A), national income identity, the excess aggregate demand (E), budget deficit (Dg), and the claims on government by the Bank of Thailand (Hg).

Identity (44), explaining Bf, is in fact the government budget constraint. Bf is modeled as a residual from other means of deficit financing. This implies that the government will adjust the level of external debt to accommodate the fiscal position. In practice, the Thai government prefers early retirement of external debt to domestic debt when the budget is in surplus. The size of monetary base varies according to the movements of claims on government and commercial banks as well as the net foreign assets. Consequently, the monetary authorities can control only the domestic source of monetary base, since the net foreign asset component of the monetary base varies by balance of payments condition under the fixed exchange rate regime.

8. IMPLICATION OF PUBLIC DEFICIT

What is the implication of public deficit on current account and other macro variables? The relationship between public deficit and current account deficit is shown in Figure 11. Although there is a clear negative correlation between the two, the causal structure of the relationship is unclear, since current account deficit may lessen the size of public deficit if the major component of tax revenue is tariff revenue. Furthermore, there might be a third factor that is positively related to the current account deficit, but negatively related to the public deficit.

As argued earlier, the partial equilibrium analysis can be

broaden by taking into account the simultaneous relationship among macro variables in the economy. The implication of public deficit can then be analyzed by examining the counterfactual simulation of public deficit from the constructed macro econometric model. Before we proceed to the policy simulation, we need to validate the estimated model by historical simulation.

8.1 Historical simulation

Historical simulations of the model were employed to determine the model ability to replicate the real world. The predictive performance of the model can be determined by comparing the predicted paths of each variable with the actual paths in the sample period. The root mean square errors (RMSEs) from the static and dynamic simulations for the 1976-1980 period and for the 1981-1986 period are presented in Table 10. The solutions derived from the static and dynamic simulations for the period mentioned above are fairly satisfactory. The RMSEs from dynamic simulation vary from 2.4 to 63 percent of its means value.

Large simulation errors mainly arise from definitional equations, for example, the trade and current account deficits. The predicted paths of all endogenous variables turned out as expected. In comparing the RMSEs from both simulation periods, it seems that the model performs better in the period 1981-1986, possibly due to the absence of major shocks which were predominant during the earlier period.

Theil inequality coefficient (U) is the RMS errors scaled down by the denominator such that its value always falls between 0 and 1 (Pindyck and Rubinfeld, 1981). A zero value of U indicates a perfect fit when the simulated value equals the actual value in every period. The Theil's inequality coefficients calculated from 1981-1986 dynamic simulation with the breakdown of their components are presented in Table 10.

8.2 Counterfactual simulation of the effects of public deficit

We performed three simulation exercises to determine the effect of public deficit on macro variables. The public expenditures were hypothetically raised by 5 percent of their actual values from 1981 to 1986. Different methods of financing the increased spending are assumed: (1) money-financed deficit, (2) tax-financed deficit, and (3) bond-financed deficit. The impact on endogenous variables are reported in Tables 12, 13, and 14, respectively.

When performing policy simulation of the effect of money-financed deficit, the claims on government by the central bank (Hg) was raised by the same amount as the increase in government spending. Hg became an exogenous variable in equation (44), which was an identity determining the amount of foreign borrowing (Bf), a residual in the government budget constraint. The increase in Hg

directly entered the monetary base equation (29), which in turn affected the quantity of money through identity (31).

Since the private sector has more quantity of working capital, the adjustment between the desired and actual level of capital stock becomes faster. Therefore, investment spending is increased as indicated in Table 12. When income grows, it generates higher consumption expenditures and demand for imports. Consequently, trade balance will worsen. In addition, the size of the public deficit will be changed since increased imports will enhance tariff revenue collection. Moreover, consumption will be affected when the disposable income is reduced by the taxation.

As the demand for imports of petroleum products grows, it feeds back into the production function of both agricultural and industrial products. Consequently, the supply constraints of export capacity is relaxed. Thus, the widening trade balance deficit will be partially offset by the increase in exports. If the aggregate demand rises faster than the output capacity, the demand pressure variable will speed up the price adjustment. In turn, the domestic prices of agricultural and industrial products are raised; thereby reducing the incentives of exporters to supply abroad.

In the financial sector, when income and price level are affected, the demand for financial assets as specified in equations (20)-(23) will be altered. An increase in the domestic price will reduce the demand for interest-yielding assets, while an increase in income level will raise it. The result from Table 12 indicates that the income effect will dominate the substitution effect. Therefore, we observe an increase in banks' deposits, which may reduce the banks' foreign borrowing. On the other hand, increased deposits necessitate banks to expand credit. As a result of the credit expansion, investment demand rises due to credit availability effect. The simulation results in Table 12 also indicate that the banks' lending rate declines. According to equation (18), foreign capital inflows are reduced, which implies that the capital mobility will reduce the impact of money-financed deficit. Investment could have expanded larger if the foreign capital inflows did not decline as a result of the money finance deficit.

When conducting policy simulation for tax-financed deficit, the constant term in the tax revenue equation (12) was raised by the same amount of the increased spending. The treatment of the variable Hg in the government budget constraint was the same as in the case of money and private bond financed budget deficit.

In the case of private bond financing, it was assumed that the substitution occurred between time deposits and government bonds. In other words, the variable GBp was exogenized in the identity (32), which became an equation determining time deposits. The behavioral equation (22) explaining time deposits was then dropped.

The impact of public deficit on the domestic rate of interest is small as expected, since it is mainly determined by the foreign interest rate. Since private investment is responsive to credit availability, the money-financed budget deficit produces the most expansionary result. Because the income elasticities of demand for imports are high, the expansion in economic activity as a result of public deficit causes a considerable increase in imports. Moreover, the price level rises most in case of money financed deficit, export competitiveness declines most in this case. As a result, money-financed deficit causes a deterioration in the current account.

Figures 12, 13, and 14 illustrate comparative impacts of different methods of deficit financing on income, the price level, and current account deficit, respectively. It is obvious that although tax-financing method is less expansionary than other methods, it produces the least inflationary pressure and causes the least current account deficit.

9. CONCLUSION

The size of public deficit did not grow substantially since it was constrained by the size of public revenues to comply with the budgetary law. The actual spending of the central government is usually below the planned expenditure level, while the planned level of revenue is overestimated during economic slump and underestimated during economic boom. Given the level of spending, the size of the deficit is countercyclical in nature.

On the revenue side, the tax capacity has increased gradually over time, as indicated by the increasing ratio of tax revenue GDP ratio. The ability of the government to increase its tax revenue relative to GDP has been increasing over time. According to the decomposition analysis, the increase in the tax ratio is the major factor contributing to a reduction in public deficit in recent years. In addition, there has been an increasing degree of automatic stabilizers and a decline in the dependency of foreign trade tax.

The pattern of deficit finance has contributed to macroeconomic stability. During the period of high deficit, the government relied less on borrowing from the central bank and relied more on borrowing from commercial banks and the private sector. As indicated by the simulation results, the money-financed public deficit causes a higher inflation rate and a more worsening current account deficit than any other methods of deficit financing.

The Thai government was able to control the growth of public spending and was successful in raising tax revenues. The simulation results also indicate that tax-financed budget deficit does not create pressure on the domestic price level. The strong growth of the Thai economy in the past can be attributed partly

to appropriate fiscal policy applied during the period of external shocks. The stable price level in turn led to a depreciation of the real effective exchange rate, further strengthening export and output growth.

In recent years, the central government deficit turned into a surplus. The continued high growth rate in the last three years produced unexpected rise in tax revenue, while the growth of public expenditure was effectively controlled. The accumulation of the large amount of treasury cash balance prompted the government to adopt an early retirement plan for foreign debts. In the 1991 fiscal year, it was the first time in recent history that the Thai government planned to run a balanced budget.

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FIGURE 1

GROWTH RATE AND INFLATION RATE

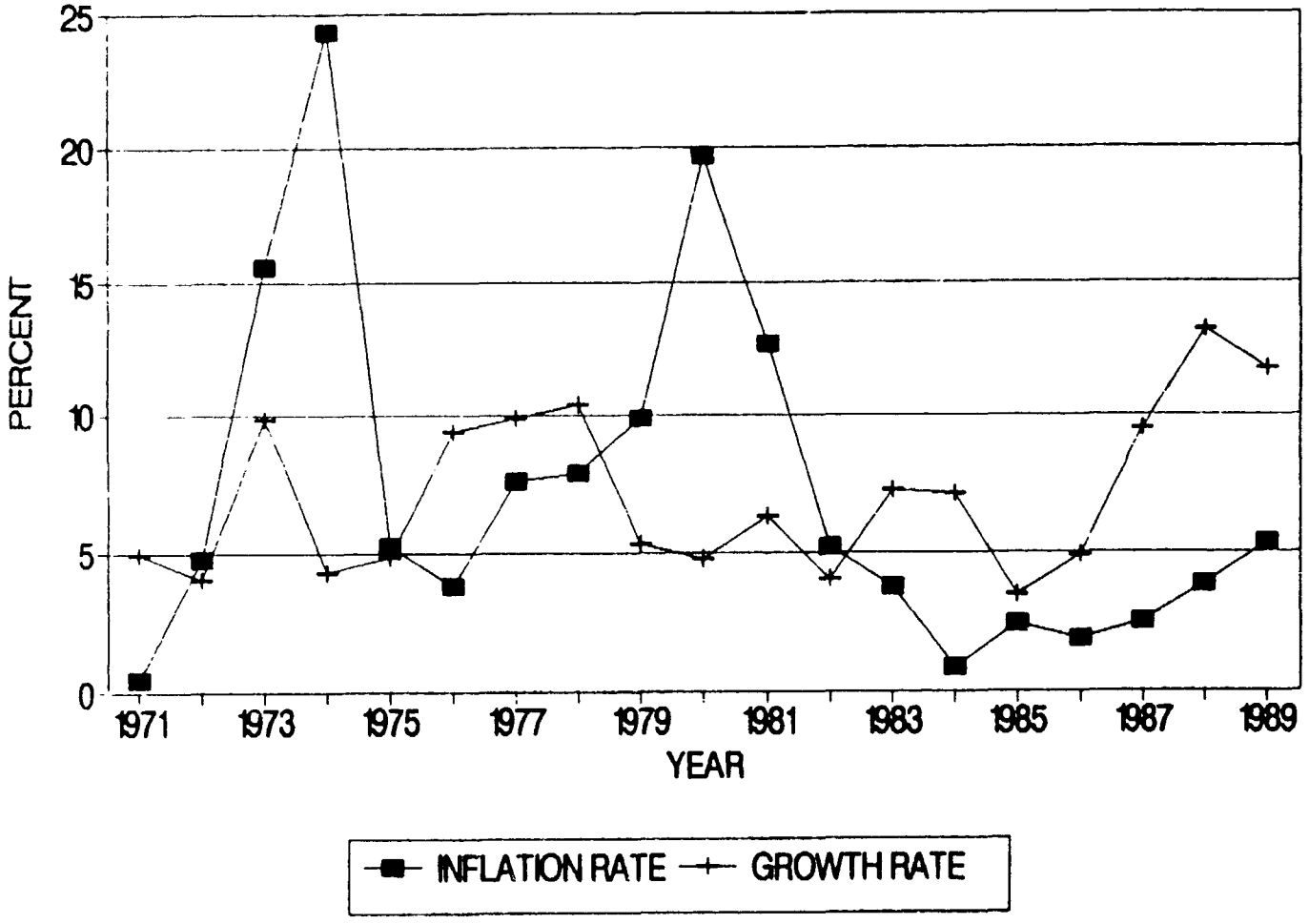

FIGURE 2

BALANCE OF PAYMENTS

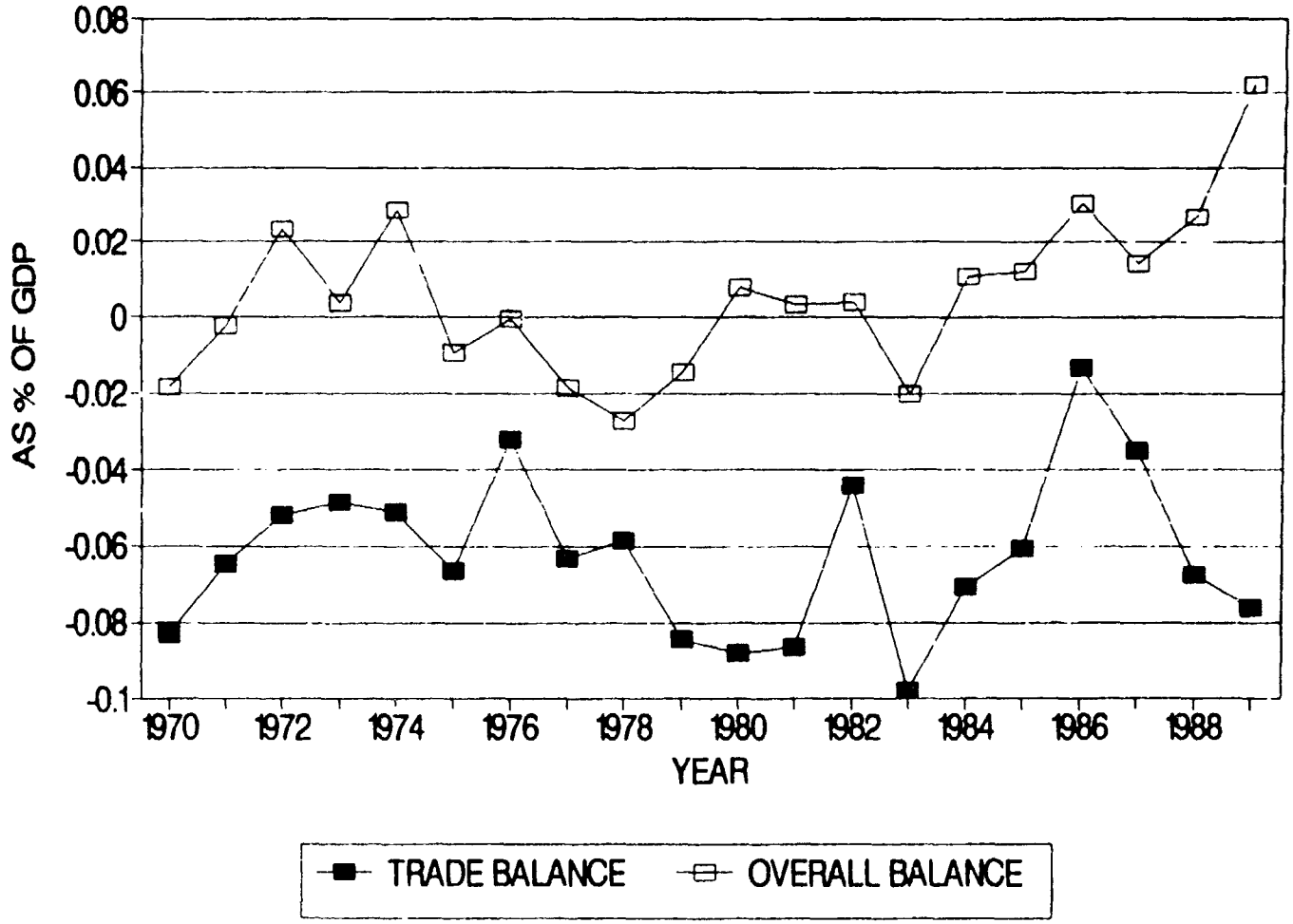

Figure 3

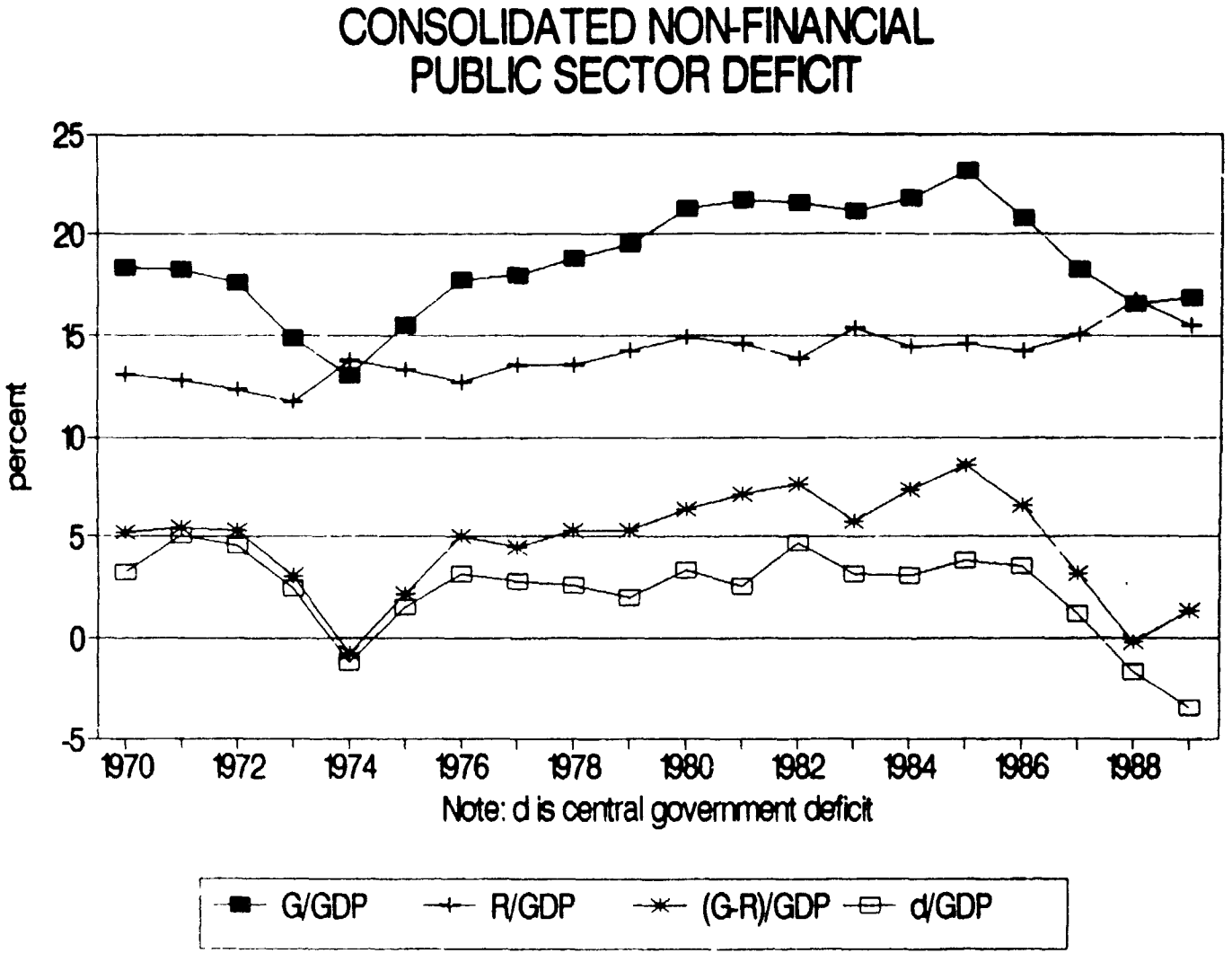
CONSOLIDATED NON-FINANCIAL
PUBLIC SECTOR DEFICIT
percent
25
20
15
10
5
0
-5
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
Note: d is central government deficit
G/GDP
R/GDP
(G-R)/GDP
d/GDP

Figure 4

CONSOLIDATED NON-FINANCIAL PUBLIC SECTOR EXPENDITURE

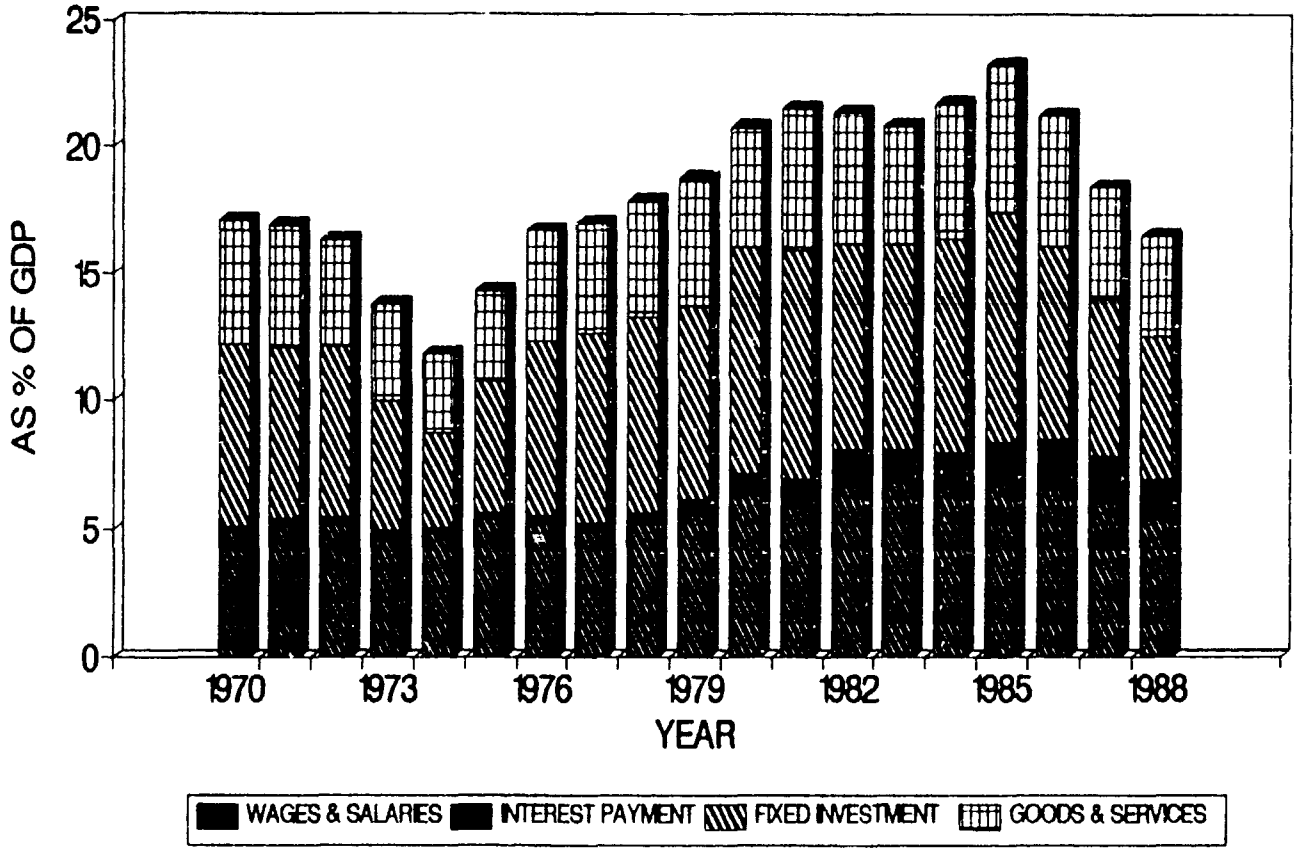

FIGURE 5

TAX STRUCTURE OF THAILAND

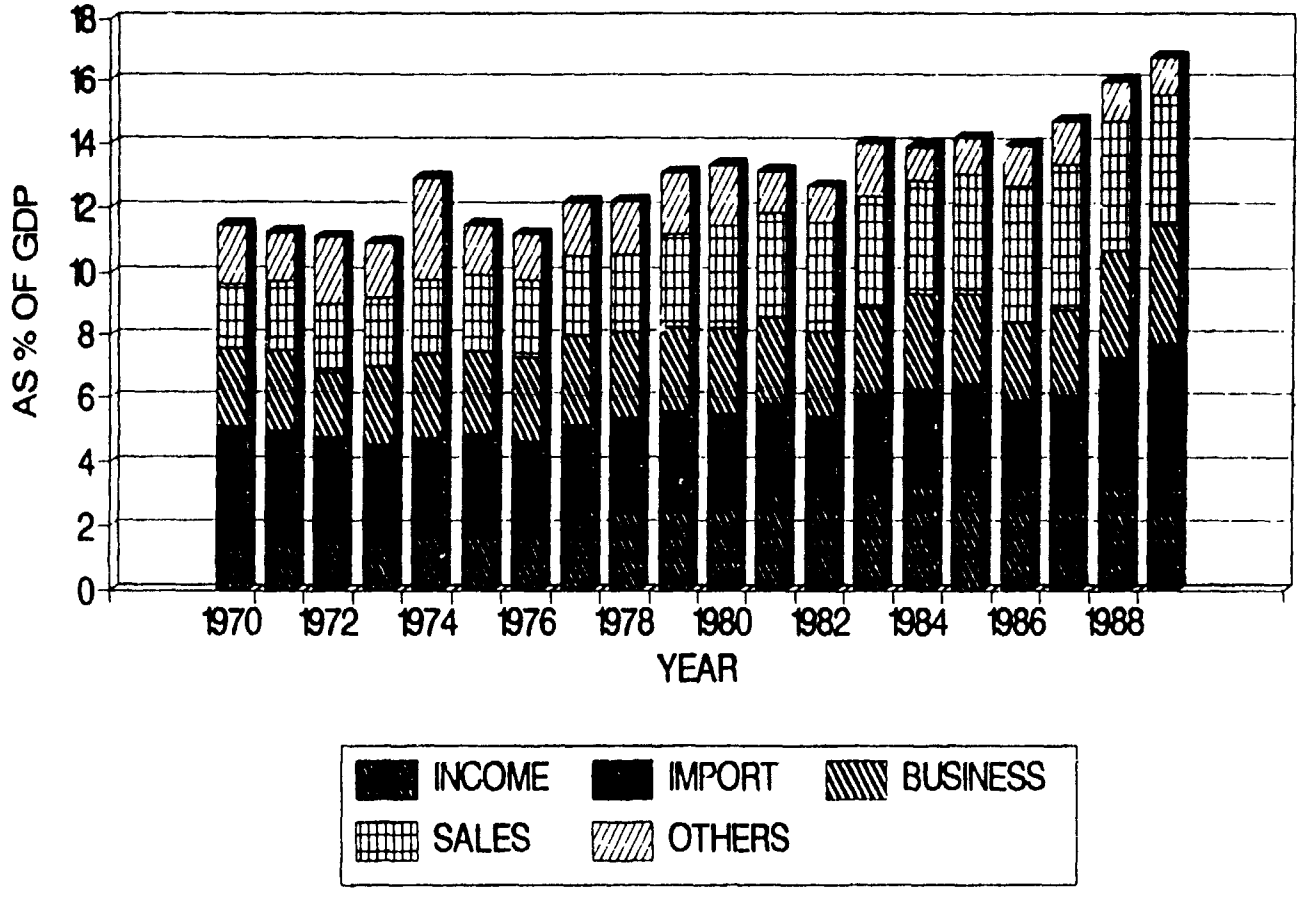

Figure 6

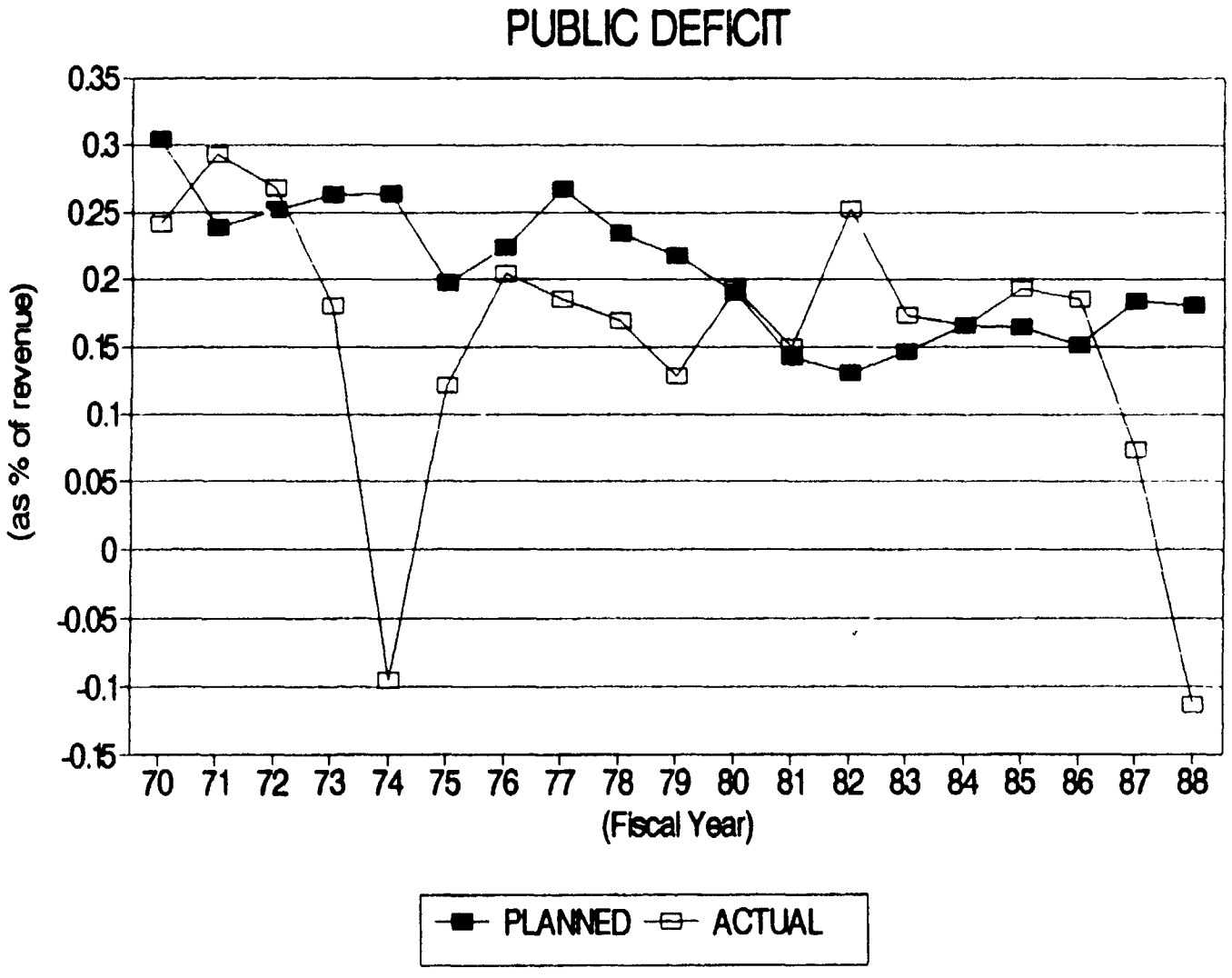
PUBLIC DEFICIT
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
(as % of revenue)
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
(Fiscal Year)
PLANNED
ACTUAL

FIGURE 7

DEBT SERVICE RATIOS

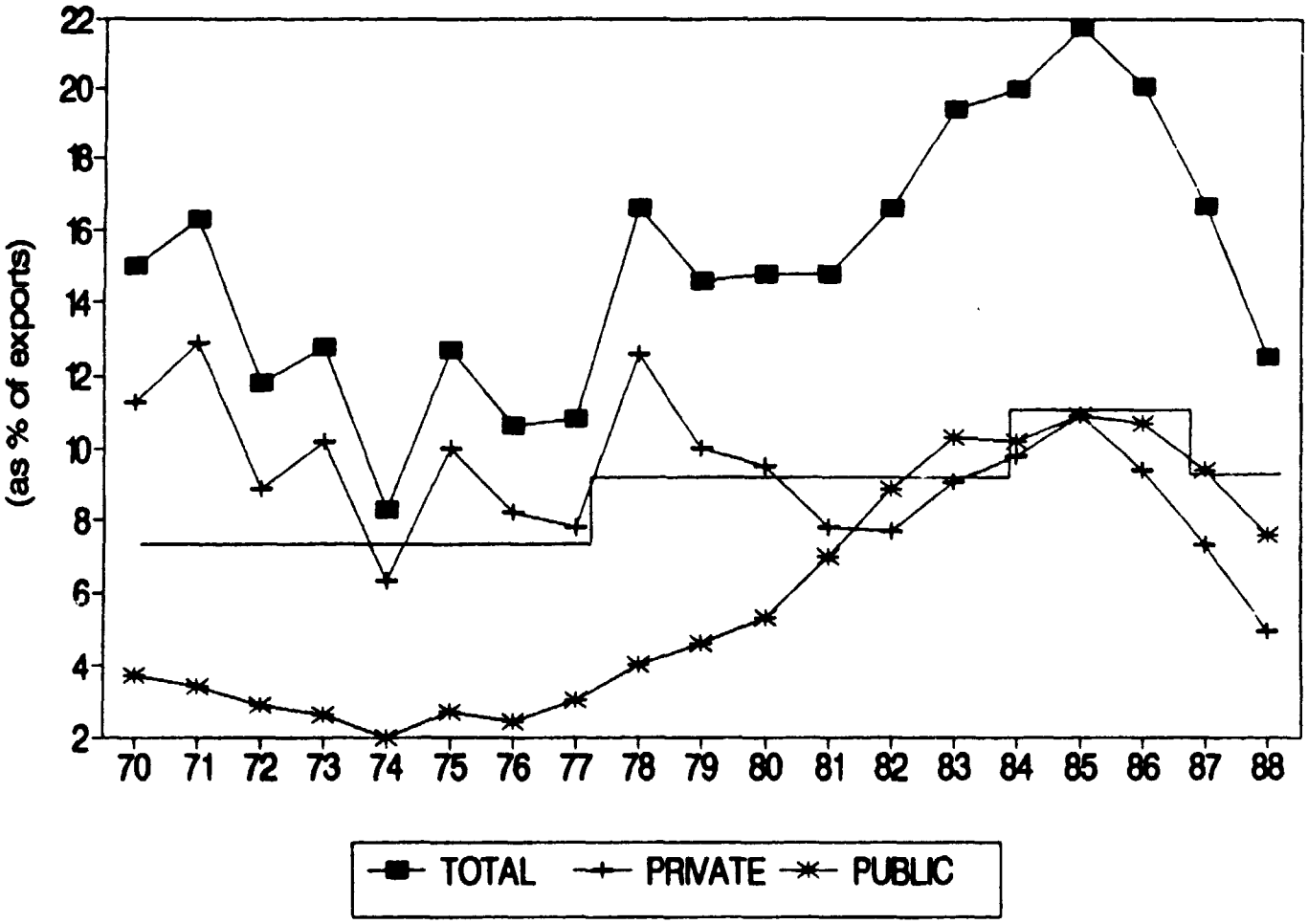

FIGURE 8

INFLATION RATES AND SEIGNIORAGE

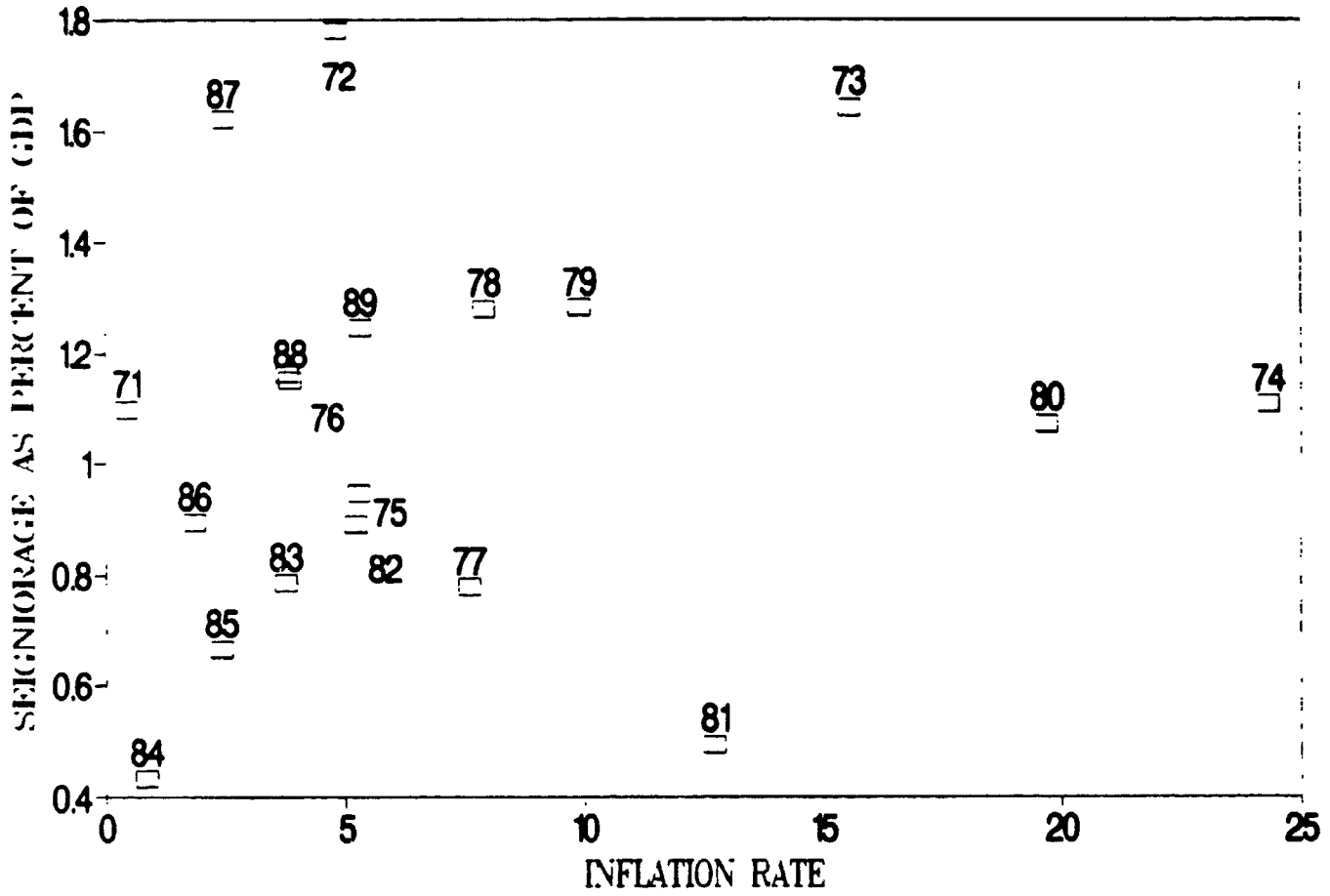

FIGURE 9

SEIGNIORAGE REVENUE

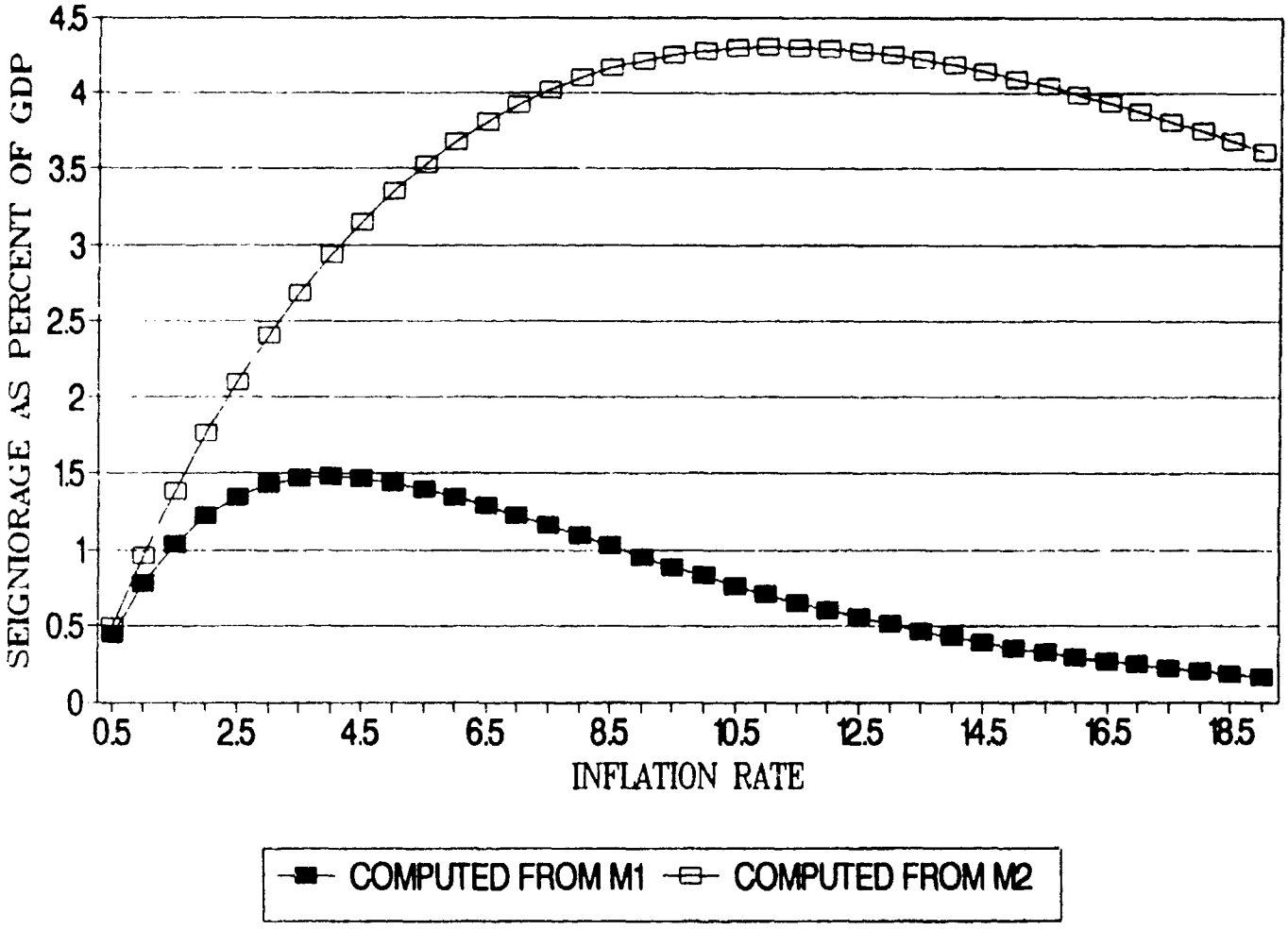

FIGURE 10

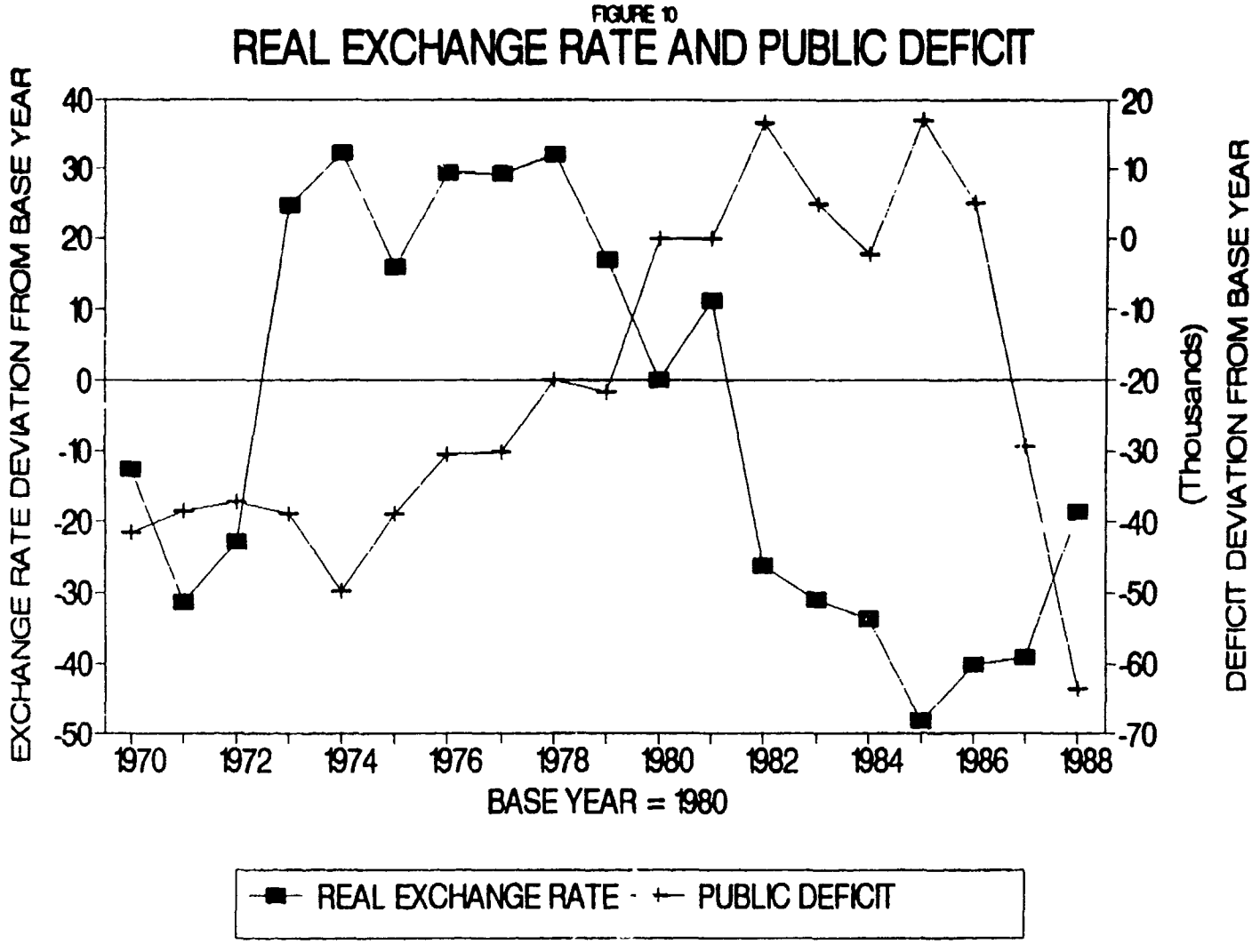
REAL EXCHANGE RATE AND PUBLIC DEFICIT
EXCHANGE RATE DEVIATION FROM BASE YEAR
DEFICIT DEVIATION FROM BASE YEAR
(Thousands)
40
30
20
10
0
-10
-20
-30
-40
-50
20
10
0
-10
-20
-30
-40
-50
-60
-70
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
BASE YEAR = 1980
REAL EXCHANGE RATE
PUBLIC DEFICIT

FIGURE 11

PUBLIC DEFICIT AND CURRENT A/C DEFICIT

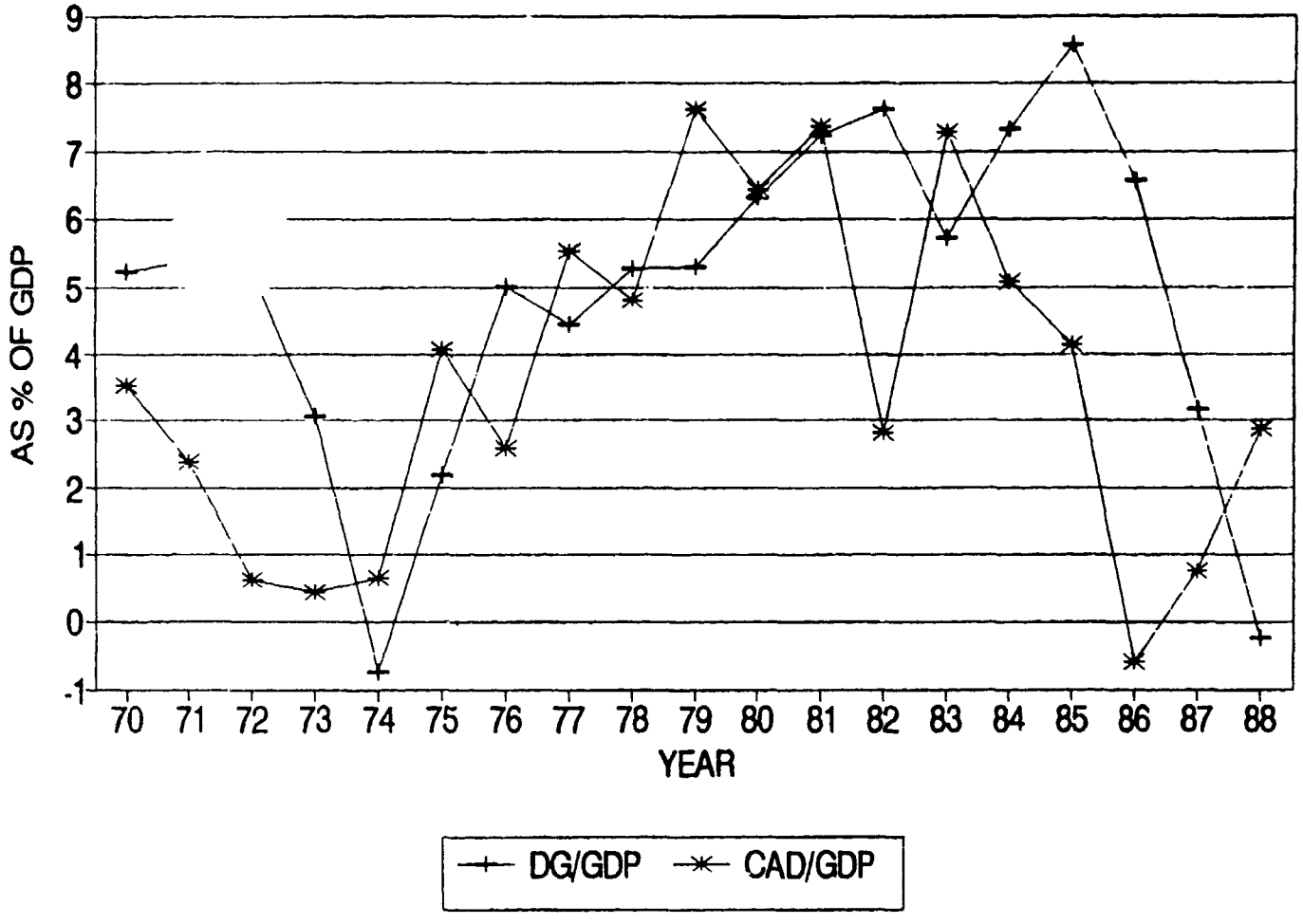

Figure 12

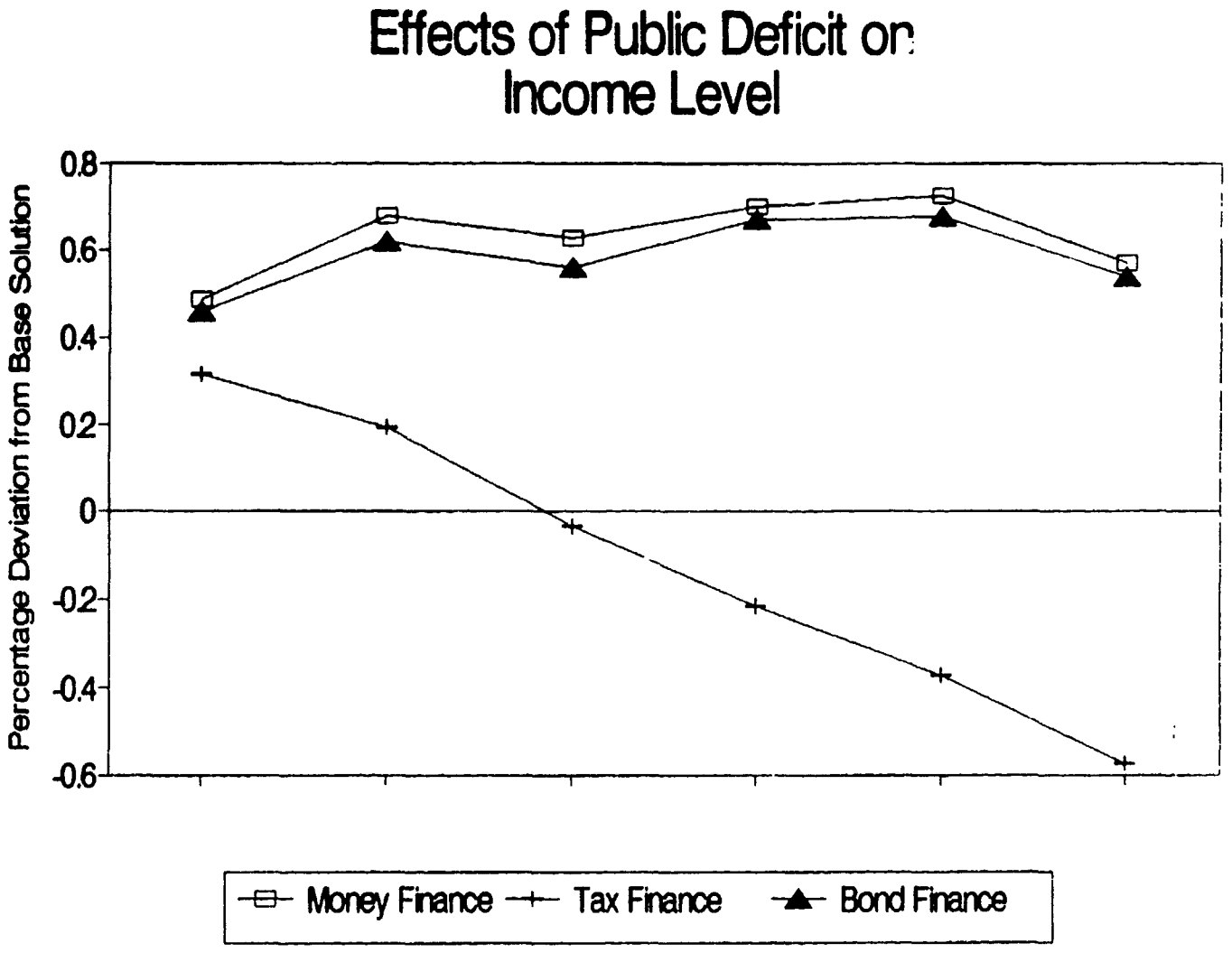
Effects of Public Deficit on Income Level
Percentage Deviation from Base Solution
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
Money Finance
Tax Finance
Bond Finance

Figure 13

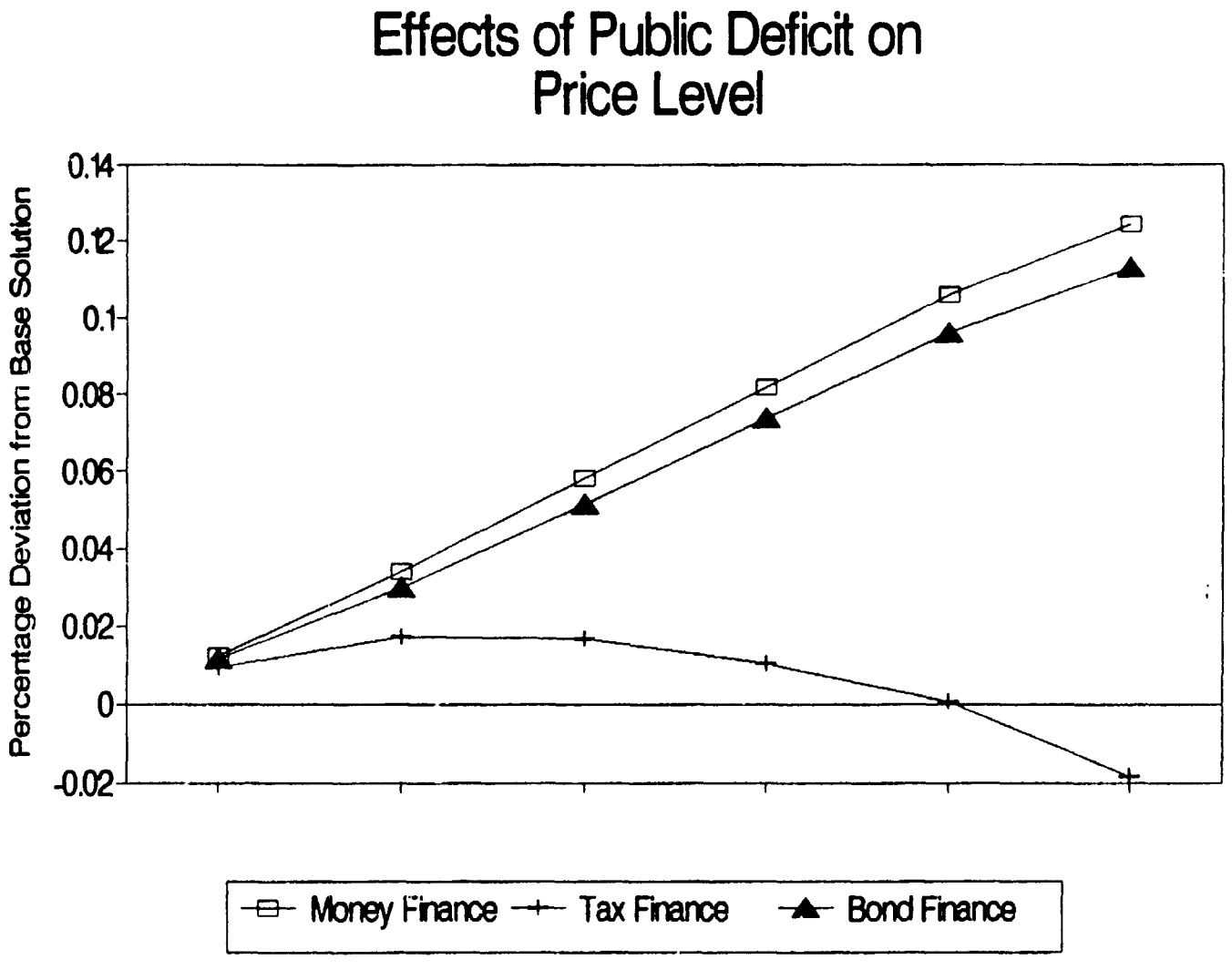
Effects of Public Deficit on Price Level
Percentage Deviation from Base Solution
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-0.02
Money Finance
Tax Finance
Bond Finance

Figure 14

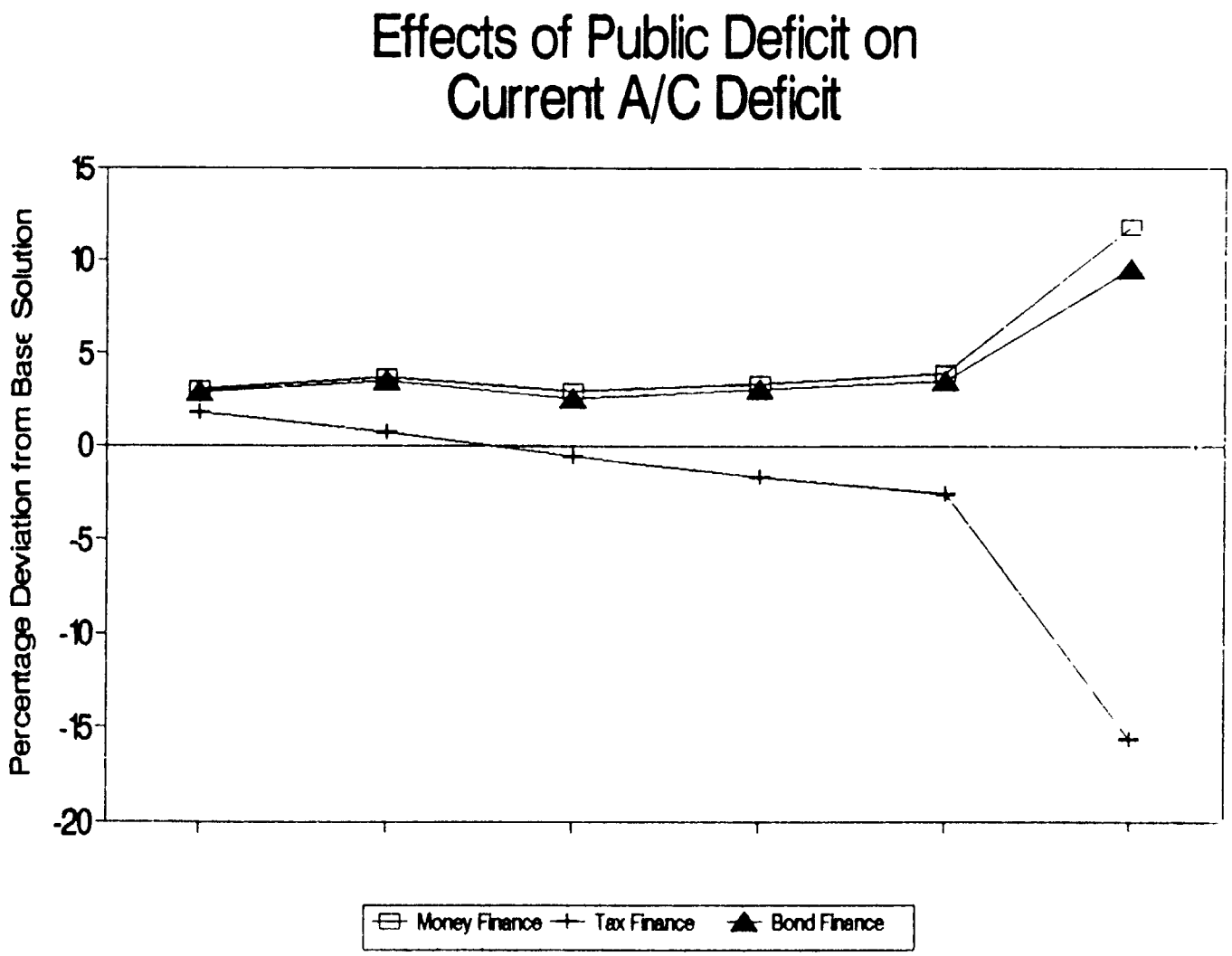
Effects of Public Deficit on
Current A/C Deficit
Percentage Deviation from Base Solution
15
10
5
0
-5
-10
-15
-20
Money Finance
Tax Finance
Bond Finance

Table 1
Expenditure Structure: Central Government
(period average)

(Percent)

Rate of Change	1971-74	1975-85	1986-89
TOTAL EXPENDITURES	8.86	17.42	7.35
Economic classification:-			
Current	13.91	17.49	8.00
	(75.04)	(78.78)	(85.79)
Interest payments *	13.11	37.31	8.19
	(1.58)	(4.75)	(10.09)
Others	13.93	16.60	8.17
	(73.46)	(74.03)	(75.70)
Capital	-4.97	17.98	4.36
	(24.96)	(21.22)	(14.21)
Major functional classification:-			
Economic services	-1.99	16.27	7.72
	(22.70)	(19.97)	(14.62)
Social services	12.35	17.36	8.12
	(28.35)	(30.13)	(29.76)
Defence	13.64	18.06	2.72
	(19.65)	(19.53)	(19.41)
General admin. & services	11.38	16.15	8.68
	(14.45)	(13.38)	(12.83)
Unallocable items	15.72	21.42	10.04
	(14.85)	(16.88)	(23.39)

Sources: 1. Customs Department
2. Comptroller-General's Department
3. Bank of Thailand, Monthly Bulletin, Table 24

Note: Figures in parentheses are average shares in respective aggreg
* Long-term External Debt and Debt service Obligations

Table 2
Tax Revenue Structure : Central Government
(period average)

(Percent)

Rate of Change	1971-74	1975-85	1986-89
TAXATION	22.00	13.80	20.49
Income taxes:-	23.19 (13.55)	20.11 (20.51)	19.30 (21.62)
Personal	12.72 (7.36)	22.99 (9.72)	10.65 (10.63)
Corporation	36.57 (6.18)	17.70 (10.79)	27.82 (10.93)
Indirect Taxes:-	21.84 (85.28)	12.58 (79.49)	21.04 (78.38)
Import duties	12.04 (27.75)	13.24 (22.66)	24.44 (22.39)
Business taxes	22.60 (21.13)	13.53 (21.74)	24.43 (20.16)
Selective sales taxes	22.31 (19.60)	17.22 (23.42)	18.14 (27.55)

Sources: 1. Customs Department
2. Comptroller-General's Department
3. Bank of Thailand, Monthly Bullentin, Table 23

Note: Figures in parentheses are average shares in respective aggregate

Table 3

Table: Expenditure Elasticities and Tax Buoyancy

	Revenue Elasticity of Public Expenditures	
	Short run	Long run
Public Consumption (Cg)	0.47	(0.98)
Public Investment (Ig)	0.31	(0.54)
Total Public Expenditure (G)	0.54	(1.01)
	Tax Buoyancy	
	(with respect to)	
Income Taxes	1.44 (personal income)	
Import Duties	0.88 (import value)	
Business Taxes	1.10 (domestic absorption)	
Sales Taxes	1.33 (domestic absorption)	

Source: Calculated from Tables 23 and 24, BOT, Monthly Bulletin.

Table 4

Deficit Ceiling

(Millions of Bath)

Fiscal Year	Ge _1/ (Expenditure)	Ga _2/ (Expenditure)	Re _1/ (Revenue)	Ra _2/ (Revenue)	(Ge-Re) / Ge	(Ga-Ra) / Ga	PR (Principal Repayment)	Cm (Maximum Expend.)	Ge/Cm (%)	Ga/Cm (%)
1970	27,300.0	23,617.0	19,020.0	17,909.0	0.303	0.242	-	-	-	-
1971	28,645.0	26,978.0	21,800.0	19,088.0	0.239	0.292	-	-	-	-
1972	29,000.0	28,905.0	21,700.0	21,165.0	0.252	0.268	-	-	-	-
1973	31,600.0	30,937.0	23,300.0	25,344.0	0.263	0.181	716.5	29,698.2	106.40	104.17
1974	36,000.0	34,629.0	26,520.0	37,921.0	0.263	(0.095)	1,511.6	34,359.3	104.78	100.78
1975	48,000.0	43,541.0	38,500.0	38,229.0	0.198	0.122	2,357.2	50,010.8	95.98	87.06
1976	62,650.0	53,686.0	48,675.0	42,731.0	0.223	0.204	3,244.1	63,439.0	98.76	84.63
1977	68,790.0	63,470.0	50,470.0	51,710.0	0.266	0.185	1,414.3	64,218.9	107.12	98.83
1978	81,000.0	74,716.0	62,000.0	62,022.0	0.235	0.170	4,124.8	80,799.8	100.25	92.47
1979	92,000.0	86,157.0	72,000.0	75,109.0	0.217	0.128	2,125.6	91,700.5	100.35	93.95
1980	114,556.5	114,287.0	92,680.0	92,147.0	0.191	0.194	3,168.5	118,384.8	96.77	96.54
1981	140,000.0	129,941.0	120,000.0	110,329.0	0.143	0.151	3,403.1	152,722.5	91.67	85.08
1982	161,000.0	152,168.0	140,000.0	113,810.0	0.130	0.252	4,578.1	178,662.5	90.11	85.17
1983	177,000.0	165,100.0	151,000.0	136,448.0	0.147	0.174	6,196.7	193,707.4	91.37	85.23
1984	192,000.0	177,402.0	160,000.0	147,847.0	0.167	0.167	8,412.7	206,730.2	92.87	85.81
1985	213,000.0	197,468.0	178,000.0	159,196.0	0.164	0.194	13,216.6	233,073.3	91.39	84.72
1986	218,000.0	204,016.0	185,000.0	166,254.0	0.151	0.185	13,833.2	242,316.6	89.96	84.19
1987	227,500.0	207,817.0	185,500.0	192,484.0	0.185	0.074	15,500.0	244,275.0	93.13	85.08
1988	243,500.0	220,655.0	199,500.0	245,646.0	0.181	(0.113)	17,357.6	263,261.1	92.49	83.82

Source : _1/ Estimated level (Thailand's Budget in Brief)
_2/ Actual level (Monthly Bulletin, BoT)

Note : ** According to the budgetary law, government deficit must not exceed 20% of the estimated expenditure plus 80% of the principal repayments of that year.

G = government expenditure

R = government revenue

a = actual

e = estimated or planned

Cm = maximum or ceiling expenditure (1.25*Re + 0.8PR)

Table 5

Decomposition of the Changes in Consolidated Non-financial Public Sector Deficits, According to Changes in Economic and Policy Determinants

(Ratio to GDP, 1971-1988)

	1971	1972	1973	1974	1975	1976	1977	1978	1979
1. Changes Due to Domestic Variables									
Real exchange rate	0.018	0.009	-0.025	-0.023	-0.014	-0.018	-0.015	-0.013	-0.008
Inflation rate	0.005	0.045	0.109	0.135	0.027	0.017	0.029	0.025	0.028
2. Changes Due to Foreign Variable									
Term of trade	0.095	0.064	-0.075	0.001	0.051	0.063	0.064	0.052	0.042
3. Changes Due to Policy Variable									
Taxation rate	0.017	0.031	0.037	-0.071	0.002	0.010	-0.023	-0.022	-0.040
SUM OF CHGS. DUE TO	0.135	0.148	0.046	0.041	0.066	0.073	0.055	0.042	0.021
CHGS. DUE TO OTHER	-0.116	-0.140	-0.054	-0.080	-0.031	-0.049	-0.054	-0.021	-0.024
CHG. CONSOLIDATED NF	0.020	0.008	-0.008	-0.039	0.036	0.024	0.001	0.021	-0.003

	1980	1981	1982	1983	1984	1985	1986	1987	1988
1. Changes Due to Domestic Variables									
Real exchange rate	-0.003	-0.005	0.002	0.003	0.003	0.005	0.004	0.003	0.001
Inflation rate	0.046	0.026	0.010	0.007	0.001	0.004	0.003	0.003	0.004
2. Changes Due to Foreign Variable									
Term of trade	0.041	0.047	0.051	0.041	0.040	0.042	0.033	0.029	0.022
3. Changes Due to Policy Variable									
Taxation rate	-0.040	-0.031	-0.021	-0.040	-0.035	-0.038	-0.032	-0.037	-0.041
SUM OF CHGS. DUE TO	0.044	0.037	0.042	0.011	0.009	0.013	0.008	-0.002	-0.015
CHGS. DUE TO OTHER	-0.012	-0.037	-0.022	-0.023	-0.017	0.006	-0.019	-0.026	-0.008
CHG. CONSOLIDATED NF	0.033	0.000	0.020	-0.013	-0.007	0.019	-0.011	-0.028	-0.023

Table 6
Sensitivity of Consolidated Non-financial
Public Sector Deficits to Change in
Economic and Policy Determinants

CHANGES IN ECONOMIC AND POLICY DETERMINANTS	SEMI-ELASTICITY	CHANGES IN NFPS DEFICIT (Percentage Point of GDP)
1. DOMESTIC VARIABLES		
PTN	-1.751	-0.071
INF	0.403	0.016
2. FOREIGN VARIABLE		
PXM	-2.805	-0.113
3. POLICY VARIABLES		
TY	-6.841	-0.276

Note: The estimations of all obtained values are based on the mean values of the relevant variables.

Table 7
Financing Public Deficit

(Percent)

Time	NDB	NFB	NOLT	UTCB	BOT	CB	GSB	Others
	(% of deficit)				(% of net domestic borrowings)			
1970	75.0	-1.3	4.1	22.2	75.7	11.0	11.2	2.1
1971	75.4	-0.8	12.2	13.3	40.6	43.4	15.7	0.4
1972	121.0	-1.4	0.2	-19.8	14.2	63.0	19.0	3.9
1973	87.6	-0.2	37.0	-24.4	21.2	24.5	48.4	6.0
1974	62.5	7.1	-71.1	101.6	238.8	-64.5	-79.7	5.4
1975	41.8	-2.6	24.7	36.2	-17.0	57.6	26.1	33.2
1976	69.0	-0.6	20.3	11.3	49.9	31.4	14.6	4.1
1977	88.4	0.9	5.1	5.6	57.5	12.1	20.0	10.4
Average	77.6	0.1	4.1	18.3	60.1	22.3	9.4	8.2
1978	109.3	-4.9	3.2	-7.6	66.5	15.8	8.7	9.1
1979	98.0	-7.1	1.6	7.5	66.0	12.2	14.2	7.7
1980	100.0	-4.7	7.8	-3.2	48.9	23.2	20.2	7.7
1981	103.5	-4.8	0.6	0.7	60.9	28.9	7.6	2.6
1982	105.9	1.9	-6.5	-1.3	37.9	31.5	11.5	19.1
1983	111.2	4.1	-17.1	1.8	38.5	13.6	25.0	22.8
1984	108.1	-2.2	-7.1	1.1	-9.2	65.3	24.9	18.9
1985	81.1	36.4	-15.7	-1.8	35.9	2.2	26.5	35.5
1986	147.1	-18.9	-23.3	-4.9	-11.8	49.4	46.9	15.5
1987	120.1	-36.9	-3.8	20.6	-80.4	103.0	36.5	40.9
1988	79.9	12.6	-1.3	8.9	166.2	-34.0	-35.9	3.8
Average	105.8	-2.2	-5.6	2.0	38.1	28.3	16.9	16.7

Source : Computed from Bank of Thailand, Monthly Bulletin, Table 25

Note : NDB = Net Domestic Borrowings
BOT = Bank of Thailand
CB = Commercial Banks
GSB = Government Saving Bank
NFB = Net Foreign Borrowings
NOLT = Net Other Liabilities of Treasury
UTCB = Use of Treasury Cash Balances

Table 8
Tradable and Non-tradable Prices

Year	PT	PN	PTN	PXN	PMN
1970	42.6	44.4	96.1	75.3	54.8
1971	41.7	46.1	90.4	65.1	55.6
1972	44.7	48.1	93.0	68.7	56.2
1973	55.0	51.1	107.6	99.1	61.7
1974	66.5	60.5	109.9	115.5	84.3
1975	68.2	65.1	104.9	101.3	87.5
1976	71.9	65.3	109.1	97.4	91.2
1977	76.2	69.9	109.0	93.7	92.4
1978	83.6	76.1	109.9	93.1	91.5
1979	90.0	85.5	105.2	99.0	94.2
1980	100.0	100.0	100.0	100.0	100.0
1981	109.4	105.8	103.4	97.3	111.7
1982	110.3	119.9	92.0	79.9	101.1
1983	113.6	125.7	90.4	77.3	91.0
1984	113.2	126.3	89.6	76.2	91.3
1985	112.5	132.0	85.2	74.9	95.7
1986	116.6	133.0	87.7	77.4	89.3
1987	122.0	138.6	88.0	79.3	91.3
1988	131.9	139.9	94.3	91.2	99.1

Source: Computed from NESDB, Px and Pm from IFS.

PT = Price of tradables
PN = Price of non-tradables
PTN = Real exchange rate
PXN = Relative prices of exportables to non-tradables
PMN = Relative prices of importables to non-tradables

Table 9

Specifications of the
Macroeconometric Model for Thailand

Trade block:

(1) Xa = f([Pxa(1-txa)*e](-1), Pda, Qa+Qp, LHSV(-1))
(2) Xi = f(e*Pfi/Pdi, [Qi/Y](-1), LHSV(-1))
(3) Xs = f(Yw*e, D80-87, LHSV(-1))
(4) Ma = f(Pma(1+ta)*e, Pda, Y/Y*, Y*, LHSV(-1))
(5) Mi = f(Pmi(1+ti)*e, Pdi, Y/Y*, Y*)
(6) Mo = f(Pmo(1+to)*e/Pdo, Y/Y*, Y*, D737480)
(7) Ms = f(X+M, D7384, D7980)

Aggregate demand and supply:

(8) Qa = f(Ka, Na, Mo, D727987)
(9) Qi = f(Ki, Ni, Mo)
(10) Cp = f(Y-(T/Pd), LHSV(-1))
(11) Ip = f(Kp(-1), Y, ln[(ΔCAp+ΔL+F)/Pd])
(12) T = f(M, A, LHSV(-1))

Price Block:

(13) Δln(Pd) = f(Δln(PM), Δln(Pxa), ln(E))
(14) Pda = f(Pd)
(15) Pdi = f(Pd)
(16) PM = f(Pma(1+ta)*e, Pmi(1+ti)*e, Pmo(1+to)*e)

Financial Block:

Interest Rate and Capital Flows:

(17) Rd = f(L, Rf, Rc, LHSV(-1))
(18) F = f(Rd, Rf, e, Pfi, Pdi, Qw)
(19) Hf = f(F, CAD, e, D87)

Private Portfolio:

(20) Z/Y*Pd = f(Rz, Δln(Pd), LHSV(-1))
(21) DD/Y*Pd = f(Rz, Δln(Pd), LHSV(-1))
(22) TD/Z = f(Rt, Rs, Rg, LHSV(-1))
(23) SD/Z = f(Rt, Rs, Rg, LHSV(-1))

Bank Portfolio:

(24) Fl = f(D, L, Rf, Rdis)
(25) L = f(D, Rd, Fl)
(26) GBb = f(D, Rd)
(27) Fa = f(D, Ru-Rd)
(28) CAb = f(D, Rd, Ru)

Identities:

(29) B = Hb + Hg + Hf + Ho
(30) D = DD + TD + SD
(31) CAp = B - CAb - OB
(32) GBp = Z - TD - SD
(33) Hb = L + GBb + Fa + CAb - D - Fl - OL
(34) X = Xa + Xi
(35) XN = (Xa * Pxa) + (Xi * Pxi)
(36) M = Ma + Mi + Mo
(37) MN = (Ma * Pma) + (Mi * Pmi) + (Mo * Pmo)
(38) TBD = MN - XN
(39) CAD = TBD + Ms - Xs - Tr
(40) A = Cp + Ip + (Cg / Pd) + (Ig / Pd)
(41) Y = A + X + (Xs / Pxs) - M - (Ms / Pms) + Dis
(42) E = ln [(A + (XN / Pd)) / (Qa + Qi + Qp)]
(43) Dg = Cg + Ig - T
(44) ΔBf = Dg - ΔGBp - ΔGBb - ΔHg - GSB + OG
(45) Pdh = exp[{ln(Pd)-a1*ln(Pda)-a2*ln(Pdi)}/(1-a1-a2)]

Table 10

Root Mean Square Errors
(Ratio to mean values)

Variables	1981 - 1986		1976 - 1980	
	Dynamic	Static	Dynamic	Static
Xa	0.1089	0.0986	0.3906	0.1326
Xi	0.1978	0.1175	0.2510	0.1443
Xs	0.0948	0.1041	0.1616	0.1265
Ma	0.1146	0.0837	0.1379	0.0977
Mi	0.1341	0.1155	0.1353	0.0858
Mo	0.2428	0.1997	0.2955	0.1282
Ms	0.3354	0.2704	0.8198	0.2344
Qa	0.1561	0.1272	0.1947	0.1051
Qi	0.0855	0.0759	0.1037	0.0417
Cp	0.0241	0.0206	0.0461	0.0209
Ip	0.3626	0.3359	0.3384	0.2552
T	0.2467	0.0966	0.2330	0.0508
Pd	0.0272	0.0254	0.0479	0.0201
Pda	0.0555	0.0569	0.0658	0.0482
Pdi	0.0469	0.0395	0.0805	0.0365
PM	0.0151	0.0151	0.0078	0.0078
Rd	0.0246	0.0232	0.0352	0.0322
F	0.1584	0.1512	0.1853	0.1786
Hf	0.1089	0.1179	0.1333	0.1482
Z	0.0511	0.0557	0.1841	0.0770
DD	0.1225	0.1412	0.1162	0.1075
TD	0.0576	0.0583	0.1592	0.0729
SD	0.1123	0.1045	0.3309	0.1236
Fl	0.1835	0.1863	0.3400	0.3469
L	0.0657	0.0658	0.1149	0.0548
GBb	0.0797	0.0888	0.2093	0.1494
Fa	0.1051	0.1114	0.1599	0.1503
CAb	0.1030	0.0995	0.0923	0.1261
B	0.0869	0.0878	0.2183	0.2401
D	0.0561	0.0588	0.1681	0.0721
CAp	0.1168	0.1173	0.2728	0.2897
GBp	0.0970	0.1213	0.3689	0.0961
Hb	0.2315	0.2311	0.6184	0.6416
X	0.1198	0.0874	0.3439	0.1148
XN	0.1256	0.0891	0.4042	0.1144
M	0.1554	0.1292	0.1834	0.0949
MN	0.1529	0.1254	0.2001	0.0876
TBD	0.3538	0.4010	0.4294	0.2083
CAD	0.6391	0.6483	0.1967	0.2750
Y	0.0509	0.0427	0.0875	0.0435
Dg	0.4267	0.1671	0.4462	0.0973
Pdh	0.027?	0.0302	0.0475	0.0448

Table 11

Theil's Inequality Coefficients and their Compositions
1981 - 1986 (Dynamic)

Variables	T	B	V	C
Xa	0.0522	0.3846	0.0000	0.6154
Xi	0.0885	0.5569	0.4210	0.0221
Xs	0.0465	0.0014	0.0165	0.9821
Ma	0.0536	0.7323	0.1793	0.0884
Mi	0.0627	0.8964	0.0009	0.1026
Mo	0.1085	0.9293	0.0333	0.0373
Ms	0.1395	0.7813	0.1010	0.1177
Qa	0.0724	0.9717	0.0183	0.0100
Qi	0.0409	0.7141	0.1473	0.1386
Cp	0.0119	0.9297	0.0426	0.0276
ip	0.1532	0.9841	0.0060	0.0099
T	0.1094	0.7589	0.2216	0.0195
Pd	0.0136	0.0023	0.1835	0.5142
Pda	0.0275	0.1399	0.0008	0.8593
Pdi	0.0234	0.0000	0.4437	0.5563
PM	0.0076	0.0003	0.1453	0.3544
Rd	0.0122	0.1319	0.0751	0.7930
F	0.0746	0.0125	0.0273	0.9602
Hf	0.0546	0.2266	0.1248	0.6486
Z	0.0239	0.8173	0.0038	0.1789
DD	0.0582	0.4573	0.0026	0.5401
TD	0.0272	0.7744	0.0800	0.1456
SD	0.0504	0.1345	0.4256	0.1398
L	0.0894	0.6023	0.0014	0.3963
GBb	0.0311	0.3140	0.0069	0.6790
Fa	0.0370	0.1182	0.0006	0.8813
Fl	0.0524	0.0242	0.6888	0.2870
CAb	0.0498	0.0022	0.2016	0.7962
B	0.0441	0.3179	0.0024	0.6797
D	0.0263	0.8120	0.0216	0.1665
CAp	0.0600	0.2909	0.0463	0.6628
GBp	0.0449	0.0064	0.6328	0.3608
Hb	0.1141	0.0523	0.4196	0.5281
X	0.0563	0.6315	0.1080	0.2605
XN	0.0588	0.6400	0.1363	0.2237
M	0.0719	0.9536	0.0104	0.0360
MN	0.0709	0.9599	0.0079	0.0322
TBD	0.1430	0.7277	0.0215	0.2508
CAD	0.2215	0.8831	0.0037	0.1132
Y	0.0247	0.9057	0.0008	0.0935
Dg	0.2578	0.7589	0.0031	0.2381
Pdh	0.0140	0.2666	0.0132	0.7202

Note: T = Theil inequality coefficients.
B = Fraction of error due to Bias.
V = Fraction of error due to Different Variation.
C = Fraction of error due to Different Covariation.

Table 12

Simulated Effects of Money Financed Public Deficit
(Percentage Deviation from Baseline Solution)

Variable	1981	1982	1983	1984	1985	1986
Xa	0.72	1.18	1.45	1.60	1.61	1.52
Xi	0.52	0.77	0.87	0.94	1.00	1.14
Xs	0.00	0.00	0.00	0.00	0.00	0.00
Ma	0.66	0.96	1.00	1.10	1.15	1.07
Mi	0.98	1.19	1.15	1.28	1.32	1.19
Mc	1.79	2.16	2.06	2.29	2.33	2.07
Ms	2.17	3.01	3.10	3.39	3.48	3.06
Qa	1.24	1.50	1.42	1.59	1.61	1.43
Qi	0.70	0.85	0.81	0.90	0.91	0.81
Cp	0.22	0.34	0.35	0.35	0.33	0.27
Ip	0.89	1.06	1.01	1.11	1.13	1.00
T	0.88	1.57	1.99	2.33	2.55	2.58
Pd	0.01	0.03	0.06	0.08	0.11	0.12
Pda	0.01	0.04	0.06	0.09	0.12	0.14
Pdi	0.01	0.04	0.06	0.09	0.12	0.14
PM	0.00	0.00	0.00	0.00	0.00	0.00
Rd	-0.01	-0.02	-0.02	-0.02	-0.03	-0.02
F	-0.04	-0.08	-0.08	-0.08	-0.08	-0.06
Hf	-1.04	-1.35	-1.65	-1.20	-1.19	-0.53
Z	0.53	0.68	0.62	0.68	0.68	0.59
DD	0.53	0.67	0.61	0.69	0.70	0.65
TD	0.54	0.66	0.58	0.61	0.59	0.53
SD	0.54	0.66	0.58	0.61	0.60	0.55
Fl	0.03	0.09	0.20	0.21	0.24	0.24
L	0.39	0.59	0.55	0.58	0.60	0.48
GBb	0.60	0.73	0.59	0.64	0.61	0.52
Fa	0.39	0.54	0.51	0.54	0.56	0.51
CAb	0.49	0.63	0.53	0.58	0.57	0.48
B	4.39	5.04	5.18	4.84	5.27	4.32
D	0.54	0.66	0.58	0.61	0.60	0.54
CAp	5.11	6.10	6.45	6.54	7.31	6.01
GBp	0.09	1.08	1.69	2.41	2.74	1.75
Hb	-0.37	1.37	1.14	0.69	1.69	-0.33
X	0.65	1.06	1.27	1.38	1.38	1.35
XN	0.65	1.04	1.26	1.36	1.34	1.32
M	1.21	1.45	1.40	1.54	1.55	1.40
MN	1.22	1.47	1.40	1.52	1.54	1.30
TBD	2.16	2.32	1.65	1.91	2.13	1.03
CAD	3.02	3.69	2.98	3.36	3.94	11.74
Y	0.48	0.68	0.63	0.70	0.73	0.57
Dg	4.28	2.52	1.68	0.38	-0.21	-4.44
Pdh	0.01	0.03	0.05	0.07	0 09	0.11

Table 13

Simulated Effects of Tax Financed Public Deficit
(Percentage Deviation from Baseline Solution)

Variable	1981	1982	1983	1984	1985	1986
Xa	0.41	0.40	0.19	-0.17	-0.55	-0.92
Xi	0.28	0.20	0.08	-0.15	-0.41	-0.64
Xs	0.00	0.00	0.00	0.00	0.00	0.00
Ma	0.39	0.28	0.03	-0.26	-0.53	-0.80
Mi	0.58	0.28	-0.06	-0.39	-0.69	-0.99
Mo	1.06	0.50	-0.12	-0.73	-1.26	-1.80
Ms	1.32	0.86	0.07	-0.75	-1.50	-2.34
Qa	0.73	0.35	-0.08	-0.51	-0.88	-1.25
Qi	0.42	0.20	-0.05	-0.29	-0.50	-0.72
Cp	-0.10	-0.40	-0.73	-1.03	-1.27	-1.41
Ip	0.47	0.23	-0.06	-0.33	-0.58	-0.83
T	3.74	5.37	5.81	5.70	5.46	4.60
Pd	0.01	0.02	0.02	0.01	0.00	-0.02
Pda	0.01	0.02	0.02	0.01	0.00	-0.02
Pdi	0.01	0.02	0.02	0.01	0.00	-0.02
PM	0.00	0.00	0.00	0.00	0.00	0.00
Rd	-0.01	-0.01	0.00	0.01	0.01	0.02
F	-0.03	-0.03	0.00	0.03	0.05	0.08
Hf	-0.63	-0.27	0.29	0.59	0.78	0.71
Z	0.31	0.15	-0.07	-0.25	-0.41	-0.57
DD	0.31	0.15	-0.06	-0.23	-0.38	-0.54
TD	0.31	0.12	-0.09	-0.26	-0.42	-0.56
SD	0.31	0.12	-0.08	-0.25	-0.41	-0.56
Fl	0.02	0.02	-0.03	-0.08	-0.15	-0.29
L	0.25	0.15	-0.08	-0.23	-0.38	-0.58
GBb	0.35	0.14	-0.09	-0.26	-0.42	-0.54
Fa	0.23	0.10	-0.07	-0.22	-0.39	-0.52
CAb	0.28	0.12	-0.08	-0.24	-0.39	-0.50
B	-0.42	0.07	0.11	0.25	0.38	0.22
D	0.31	0.12	-0.08	-0.26	-0.41	-0.56
CAp	-0.55	0.06	0.16	0.42	0.67	0.51
GBp	0.36	0.84	0.40	0.03	-0.21	-0.86
Hb	0.15	1.02	-0.08	-0.12	-0.33	-0.95
X	0.37	0.34	0.15	-0.16	-0.50	-0.80
XN	0.37	0.33	0.15	-0.16	-0.49	-0.78
M	0.72	0.35	-0.07	-0.47	-0.82	-1.18
MN	0.72	0.35	-0.07	-0.47	-0.81	-1.09
TRD	1.31	0.38	-0.48	-1.19	-1.73	-4.62
CAD	1.84	0.72	-0.53	-1.67	-2.58	-15.66
Y	0.31	0.19	-0.04	-0.22	-0.37	-0.57
Dg	-0.96	-5.41	-10.69	-12.99	-10.91	-21.35
Pdh	0.01	0.02	0.01	0.01	0.00	-0.02

Table 11

Simulated Effects of Bond Financed Public Deficit
(Percentage Deviation from Baseline Solution)

Variable	1981	1982	1983	1984	1985	1986
Xa	0.68	1.14	1.42	1.55	1.56	1.48
Xi	0.49	0.76	0.95	0.95	1.02	1.15
Xs	0.00	0.00	0.00	0.00	0.00	0.00
Ma	0.63	0.92	0.92	1.04	1.07	0.99
Mi	0.93	1.14	1.01	1.21	1.23	1.09
Mo	1.70	2.08	1.87	2.17	2.18	1.91
Ms	2.05	2.81	3.00	3.27	3.33	2.98
Qa	1.18	1.41	1.29	1.50	1.51	1.32
Qi	0.67	0.82	0.73	0.85	0.85	0.75
Cp	0.21	0.33	0.31	0.32	0.31	0.25
Ip	0.74	0.86	0.74	0.92	0.87	0.78
T	0.84	1.50	1.86	2.19	2.39	2.41
Pd	0.01	0.03	0.05	0.07	0.10	0.11
Pda	0.01	0.03	0.06	0.08	0.10	0.12
Pdi	0.01	0.03	0.06	0.08	0.11	0.13
PM	0.00	0.00	0.00	0.00	0.00	0.00
Rd	-0.01	0.00	0.02	0.00	0.01	0.01
F	-0.02	0.01	0.06	0.01	0.05	0.05
Hf	-0.98	-1.26	-1.35	-1.06	-1.03	-0.42
Z	0.50	0.66	0.60	0.68	0.67	0.57
DD	0.51	0.65	0.58	0.67	0.66	0.60
TD	0.29	-0.45	-0.99	-0.26	-0.93	-0.61
SD	0.52	0.65	0.60	0.65	0.62	0.57
Fl	0.02	-0.02	-0.17	0.01	-0.16	-0.11
L	0.23	-0.15	-0.47	0.00	-0.41	-0.21
GBb	0.39	-0.19	-0.56	-0.04	-0.51	-0.19
Fa	0.25	-0.14	-0.48	-0.03	-0.46	-0.18
CAb	0.32	-0.17	-0.50	-0.03	-0.47	-0.18
R	-0.82	-0.76	-0.89	-0.21	-0.49	-0.60
D	0.35	-0.18	-0.55	-0.04	-0.50	-0.20
CAp	-1.03	-0.91	-0.98	-0.28	-0.54	-0.80
GBp	-	-	-	-	-	-
Hb	-0.52	-0.09	0.03	0.46	0.72	-0.40
X	0.62	1.03	1.27	1.35	1.36	1.33
XN	0.62	1.01	1.26	1.33	1.31	1.31
M	1.15	1.40	1.27	1.46	1.45	1.29
MN	1.16	1.41	1.27	1.44	1.44	1.20
TBD	2.06	2.21	1.28	1.69	1.80	-0.12
CAD	2.88	3.50	2.52	3.06	3.51	9.49
Y	0.46	0.62	0.56	0.67	0.68	0.54
Dg	4.36	2.67	2.09	0.94	0.38	-2.98
Pdh	0.01	0.03	0.05	0.06	0.08	0.10

Appendix A

Table 15

List of Endogenous Variables
in the
Macroeconometric Model for Thailand

A	=	domestic absorption
B	=	monetary base
Bf	=	stock of government's external debt
CAb	=	cash and claim on BOT by commercial banks
CAD	=	current account deficits
CAp	=	notes in circulation
Cp	=	private consumption expenditures (real)
D	=	total deposits
DD	=	demand deposits
Dg	=	deficits in government budget
E	=	excess capacity defined as the ratio of capacity output to real GDP in the logarithmic form
F	=	foreign capital inflows
Fa	=	foreign assets
Fl	=	foreign liabilities
GBb	=	government bonds held by commercial banks
GBp	=	government bonds held by private sector
Hf	=	net foreign assets of the Bank of Thailand
Ip	=	private capital formation expenditures (real)
L	=	commercial bank credits
M	=	aggregate imports (real)
Ma	=	import value of agricultural products (real)
Mi	=	import value of industrial products (real)
MN	=	aggregrate merchandise imports
Mo	=	import value of petroleum products (real)
Ms	=	non-merchandised imports (real)
OL	=	other liabilities of commercial banks
Pd	=	GDP deflator
Pda	=	domestic price of agricultural products
Pdi	=	domestic price of industrial products
PM	=	aggregate import price index
Pxa	=	export price index of agricultural products
Qa	=	value added of agricultural products
Qi	=	value added of industrial products
Rd	=	interest rate on commercial bank credit
SD	=	saving deposits
T	=	government tax revenues
TBD	=	trade deficits
TD	=	time deposits
X	=	aggregate exports (real)
Xa	=	export value of agricultural products (real)
Xi	=	export value of industrial products (real)
XN	=	aggregrate merchandise exports
Xs	=	non-merchandised exports (real)
Y	=	gross domestic product (real)
Z	=	interest-yielding financial assets in private sector

Table 16

List of Exogenous Variables:
in the
Macroeconometric Model for Thailand

Cg	=	public consumption expenditures (real)
Dis	=	discrepancies in national income identity (real)
D727380	=	dummy variable (1 for 1972, 1973, and 1980, 0 for the otherwise)
D7384	=	dummy variable (1 for 1973 and 1984, 0 for the otherwise)
D7980	=	dummy variable (1 for 1979 and 1980, 0 for the otherwise)
D8087	=	dummy variable (1 for 1980 to 1987, 0 for the otherwise)
D85	=	dummy variable (1 for 1985, 0 for the otherwise)
D87	=	dummy variable (1 for 1987, 0 for the otherwise)
e	=	effective exchange rate index
GSB	=	government's borrowing from Government Saving Bank
Hb	=	claims on commercial banks by the Bank of Thailand
Hg	=	claims on the government by the Bank of Thailand
Ho	=	other components of monetary base
Ig	=	public capital formation (real)
Ka	=	capital stock in agricultural sector (real)
Ki	=	capital stock in industrial sector (real)
Kp	=	private capital stock (real)
Na	=	number of labor employed in agricultural sector
Ni	=	number of labor employed in industrial sector
OB	=	other uses of base
OG	=	other financing of government deficits
Pdo	=	domestic price index of petroleum products
Pfa	=	export price index of agricultural products from competing countries
Pfi	=	export price index of industrial countries
Pma	=	import price index of agricultural products
Pmi	=	import price index of industrial products
Pmo	=	import price index of petroleum products
Pms	=	import price index of other import products
Pw	=	world commodity price index
Pxs	=	export price index of other export products
Qp	=	value added of public utilities
Qw	=	industrial production index (for 19 industrial countries)
Rc	=	ceiling interest rate on bank credits
Rdis	=	discount rate
Rf	=	foreign interest rate (Eurodollar rate)
Rg	=	government bond rate
Rs	=	interest rate of saving deposits
Rt	=	interest rate of time deposits
Ru	=	interest rate on US's government bonds (mid-term)
Rz	=	interest rate on interest-yeild financial assets in private sector
ta	=	tariff rate of agricultural products
ti	=	tariff rate of industrial products
to	=	tariff rate of petroleum products
Tr	=	unrequited transfer from abroad
txa	=	export tax rate of agricultural products
Yw	=	world import trend (real)
Y*	=	income trend (real)

Appendix B

Results of The Estimations
(1970 - 1987)

Foreign trade block:

$$(1)\ \ln(Xa) = -11.598 + \underset{(2.725)}{1.145^{*}}\ \ln(Pxat(-1)) - \underset{(3.158)}{1.789^{**}}\ \ln(Pda) + \underset{(2.117)}{1.468}\ \ln(Qa+Qp) + \underset{(1.913)}{0.635}\ \ln(Xa(-1)) ;$$

where Pxat = Pxa(1-txa)*e

$R^2 = 0.941$ DW = 2.38^{***} S = 0.104

Xa = export values of agricultural products (real)
Pxa = export price index of agricultural products
Pda = domestic price index of agricultural products
Qa = value added of agricultural products
Qp = value added of public utilities
txa = export tariff rate of agricultural products
e = effective exchange rate index

$$(2)\ \ln(Xi) = -6.275 + \underset{(2.326)}{0.517^{*}}\ \ln(e*Pfi/Pdi) + \underset{(2.930)}{2.655^{*}}\ \ln[Qi/Y](-1) + \underset{(4.570)}{0.538^{**}}\ \ln(Xi(-1))$$

$R^2 = 0.942$ Dh = -0.90 S = 0.150

Xi = export values of industrial products (real)
e = effective exchange rate index
Pfi = export price index of industrial countries
Pdi = domestic price index of industrial products
Qi = value added of industrial products (real)
Y = gross domestic products (real)

$$(3)\ \ln(Xs) = -3.712 + \underset{(3.716)}{1.395^{**}}\ \ln(Yw*e) + \underset{(2.859)}{0.456^{*}}\ (D80\text{-}87) + \underset{(1.969)}{0.358}\ \ln(Xs(-1))$$

$R^2 = 0.979$ DW = 1.47 S = 0.106

Xs = non-merchandise exports
Yw = world import trend (real)
e = effective exchange rate index
D80 87 = dummy variable (1 for 1980 to 1987, otherwise 0)

$$(4)\ \ln(Ma) = -10.876 - \underset{(3.886)}{0.858^{**}}\ \ln(Pma(1+ta)*e) + \underset{(1.245)}{0.273}\ \ln(Pda) + \underset{(2.023)}{1.255}\ \ln(Y/Y*) + \underset{(6.993)}{1.582^{**}}\ \ln(Y*) + \underset{(1.523)}{0.234}\ \ln(Ma(-1))$$

$R^2 = 0.969$ Dh = -1.10 S = 0.069

Ma = import values of agricultural products (real)
Pma = import price index of agricultural products
ta = tariff rate of agricultural products
e = effective exchange rate index
Pda = domestic price index of agricultural products
Y = gross domestic products (real)
Y* = trend of income (real)

$$(5)\ \ln(Mi) = -6.295 - \underset{(2.382)}{0.789^{*}}\ \ln(Pmi(1+ti)*e) + \underset{(1.603)}{0.433}\ \ln(Pdi) + \underset{(2.223)}{1.850^{*}}\ \ln(Y/Y*) + \underset{(5.183)}{1.462^{**}}\ \ln(Y*)$$

$R^2 = 0.944$ DW = 2.168 S = 0.080

Mi = import values of industrial products (real)
Pmi = import price index of industrial products
ti = tariff rate of industrial products
e = effective exchange rate index
Pdi = domestic price index of industrial products
Y = gross domestic products (real)
Y* = trend of income (real)

$$(6)\ \ln(Mo) = 4.280 - \underset{(1.679)}{0.162}\ \ln(Pmo(1+to)*e/Pdo) + \underset{(1.030)}{3.390^{**}}\ \ln(Y/Y*)$$

$$+ \underset{(4.505)}{0.486^{**}}\ \ln(Y*) + \underset{(1.372)}{0.060}\ (D737480)$$

$R^2 = 0.861$ DW = 2.05 S = 0.068

Mo	=	import values of petroleum products (real)
Pmo	=	import price index of petroleum products
to	=	tariff rate of petroleum products
e	=	effective exchange rate index
Pdo	=	domestic price index of petroleum products
Y	=	gross domestic products (real)
Y*	=	trend of income (real)
D737480	=	dummy variable (1 for 1973, 1974, and 1980, otherwise 0)

$$(7)\ \ln(Ms) = -19.364 + \underset{(12.164)}{2.287^{**}}\ \ln(Ma+Mi+Mo+Xa+Xi) - \underset{(3.688)}{0.380^{**}}\ (D7384)$$

$$+ \underset{(3.392)}{0.352^{**}}\ (D7980)$$

$R^2 = 0.979$ DW = 1.32 S = 0.136

Ms	=	non-merchandise imports (real)
Ma	=	import values of agricultural products (real)
Mi	=	import values of industrial products (real)
Mo	=	import values of petroleum products (real)
Xa	=	export values of agricultural products (real)
Xi	=	export values of industrial products (real)
D7384	=	dummy variable (1 for 1973 and 1981, otherwise 0)
D7980	=	dummy variable (1 for 1979 and 1980, otherwise 0)

Aggregate Demand and Supply:

$$(8)\ \ln(Qa) = 2.693 + 0.112\ \ln(Ka) + 0.111\ \ln(Na) + 0.694^{**}\ \ln(Mo) - 0.073\ (D727987)$$
$$(1.477) \qquad (0.428) \qquad (4.594) \qquad (1.707)$$

$R^2 = 0.876$ DW = 1.59 S = 0.063

Qa = value added of agricultural products
Ka = capital stocks in agricultural sector (real)
Na = number of labor employed in agricultural sector
Mo = import values of petroleum products (real)
D727987 = dummy variable (1 for 1972, 1979, and 1987, otherwise 0)

$$(9)\ \ln(Qi) = -1.275 + 0.710^{**}\ \ln(Ki) + 0.135^{*}\ \ln(Ni) + 0.395^{**}\ \ln(Mo)$$
$$(16.248) \qquad (2.028) \qquad (4.773)$$

$R^2 = 0.991$ DW = 1.73 S = 0.039

Qi = value added of industrial products
Ki = capital stocks in industrial sector (real)
Ni = number of labor employed in industrial sector
Mo = import values of petroleum products (real)

$$(10)\ \ln(Cp) = 0.128 + 0.472^{**}\ \ln(Y-(T/Pd)) + 0.510^{**}\ \ln(Cp(-1))$$
$$(3.117) \qquad (3.268)$$

$R^2 = 0.998$ Dh = 0.30 S = 0.012

Cp = private consumption expenditures (real)
Y = gross domestic products (real)
T = government tax revenues
Pd = GDP deflator

$$(11)\ \ln(Ip) = 2.863 - \underset{(1.171)}{0.893}\ \ln(Kp(-1)) + \underset{(2.095)}{1.466}\ \ln(Y) + \underset{(2.414)}{0.118^{*}}\ \ln((\ CAp(-1) + \ I(-1)+F)/Pd)$$

$R^2 = 0.962$ DW = 1.35 S = 0.056

Ip = private capital formation expenditures (real)
Kp = private capital stocks (real)
Y = gross domestic products (real)
CAp = notes in circulation
I = commercial bank credits
F = foreign capital inflows
Pd = GDP deflator

$$(12)\ \ln(T) = -6.975 + \underset{(2.063)}{0.492}\ \ln(M) + \underset{(0.533)}{0.393}\ \ln(Cp+Ip+(Cg+Ig)/Pd) + \underset{(2.443)}{0.634^{*}}\ \ln(T(-1))$$

$R^2 = 0.992$ DW = 2.12 S = 0.069

T = government tax revenues
M = aggregate merchandise imports (real)
Cp = private consumption expenditures (real)
Ip = private capital formation expenditures (real)
Cg = public consumption expenditures
Ig = public capital formation
Pd = GDP deflator

Price block:

$$(13)\ \ln(Pd) = \underset{(4.036)}{0.203^{**}}\ \ln(PM/PM(-1)) + \underset{(5.713)}{0.203^{**}}\ \ln(Pxa/Pxa(-1)) + \underset{(4.757)}{0.100^{**}}\ E + \ln(Pd(-1))$$

$R^2 = 0.934$ DW = 1.51 S = 0.021

Pd = GDP deflator
PM = aggregate import price index
Pxa = export price index of agricultural products
E = demand pressure variable

(14) $\ln(Pda) = -0.489 + 1.095^{**} \ln(Pd)$
(11.756)

$R^2 = 0.991$ DW = 1.67 S = 0.037

Pda = domestic price index of agricultural products
Pd = GDP deflator

(15) $\ln(Pdi) = -0.571 + 1.110^{**} \ln(Pd)$
(19.234)

$R^2 = 0.993$ DW = 1.60 S = 0.034

Pdi = domestic price index of industrial products
Pd = GDP deflator

(16) $\ln(PM) = -0.528 + 0.099 \ln(Pma(1+ta)*e) + 0.758^{**} \ln(Pmi(1+ti)*e)$
(0.816) (9.303)

$+ 0.229^{**} \ln(Pmo(1+to)*e)$
(7.068)

$R^2 = 0.997$ DW = 2.60 S = 0.032

PM = aggregate import price index
e = effective exchange rate index
Pma = import price index of agricultural products
Pmi = import price index of industrial products
Pmo = import price index of petroleum products
ta = tariff rate of agricultural products
ti = tariff rate of industrial products
to = tariff rate of petroleum products

Financial block:

Interest Rate and Capital Flows:

$$\ln(Rd) = -0.099 - \underset{(2.673)}{0.030^{*}}\ln(L) + \underset{(4.851)}{0.147^{**}}\ln(Rf) + \underset{(5.394)}{0.746^{**}}\ln(Rc) + \underset{(2.343)}{0.237^{*}}\ln(Rd(-1)) \quad (17)$$

$R^2 = 0.946$ Dh = 0.86 S = 0.031

Rd = interest rate on commercial bank credits
L = commercial bank credits
Rf = foreign interest rate (Eurodollar rate)
Rc = ceiling interest rate on bank loans

$$\ln(F) = -16.992 + \underset{(6.950)}{3.745^{**}}\ln(Rd) - \underset{(3.486)}{0.444^{**}}\ln(Rf) - \underset{(9.811)}{3.316^{**}}\ln(e) + \underset{(6.918)}{1.438^{**}}\ln(Pfi) + \underset{(0.259)}{0.087}\ln(Pdi) + \underset{(8.736)}{5.888^{**}}\ln(Qw) \quad (18)$$

$R^2 = .979$ DW = 2.01 S = 0.137

F = foreign capital inflows
Rd = interest rate on commercial bank credits
Rf = foreign interest rate (Eurodollar rate)
e = effective exchange rate index
Pfi = export price index of industrial countries
Pdi = domestic price index of industrial products
Qw = industrial production index for 19 industrial countries

$$Hf = -15402.7 + \underset{(2.331)}{0.338}(F) - \underset{(2.392)}{0.218}(CAD) + \underset{(3.145)}{563.670^{**}}(e) + \underset{(4.646)}{3441?.8^{**}}(D87) \quad (19)$$

$R^2 = 0.918$ DW = 1.40 S = 5746.63

Hf = net foreign assets of the Bank of Thailand
F = foreign capital inflows
CAD = current account deficits
e = effective exchange rate index
D87 = dummy variable (1 for 1987, otherwise 0)

Private Portfolio:

$$(20)\quad Z/Y*Pd = -0.019 + \underset{(4.600)}{0.008^{**}}\ Rz - \underset{(5.004)}{0.249^{**}}\ Ln(Pd/Pd(-1)) + \underset{(38.714)}{0.982^{**}}\ LHSV(-1)$$

$R^2 = 0.993 \qquad DW = 1.78 \qquad S = 0.011$

Z = interest-yeild financial assets in private sector
Y = gross domestic products (real)
Pd = GDP deflator
Rz = interest rate on interest-yeild financial assets in private sector

$$(21)\quad DD/Y*Pd = 0.028 - \underset{(2.966)}{0.002^{**}}\ Rz - \underset{(1.483)}{0.022}\ Ln(Pd/Pd(-1)) + \underset{(4.701)}{0.654^{**}}\ LHSV(-1)$$

$R^2 = 0.852 \qquad DW = 2.79 \qquad S = 0.003$

DD = demand deposits
Y = gross domestic products (real)
Pd = GDP deflator
Rz = interest rate on interest-yeild financial assets in private sector

$$(22)\quad TD/Z = 0.140 + \underset{(3.156)}{0.023^{**}}\ Rt - \underset{(6.463)}{0.032^{**}}\ Rs + \underset{(1.074)}{0.005}\ Rg + \underset{(12.472)}{0.748^{**}}\ LHSV(-1)$$

$R^2 = 0.965 \qquad DW = 1.64 \qquad S = 0.013$

TD = time deposits
Z = interest-yeild financial assets in private sector
Rt = interest rate of time deposits
Rs = interest rate of saving deposits
Rg = interest rate of government bonds

$$(23)\quad SD/Z = \underset{}{0.122} - \underset{(3.009)}{0.020^{**}}\, Rt + \underset{(6.309)}{0.032^{**}}\, Rs - \underset{(2.056)}{0.008}\, Rg + \underset{(8.969)}{0.692^{**}}\, LHSV(-1)$$

$R^2 = 0.969 \qquad DW = 1.35 \qquad S = 0.012$

SD = saving deposits
Z = interest-yeild financial assets in private sector
Rt = interest rate on time deposits
Rs = interest rate on saving deposits
Rg = interest rate on government bonds

Bank Portfolio:

$$(24)\quad Ln(Fl) = \underset{}{2.428} - \underset{(8.459)}{1.853^{**}}\, Ln(D) + \underset{(11.442)}{2.412^{**}}\, Ln(L) - \underset{(2.503)}{0.162^{*}}\, Ln(Rf) + \underset{(8.581)}{0.594^{**}}\, Ln(Rdis)$$

$R^2 = 0.967 \qquad DW = 1.12 \qquad S = 0.133$

Fl = foreign liabilities
D = total deposits
L = commercial bank credits
Rf = foreign interest rate (Eurodollar rate)
Rdis = discount rate

$$(25)\quad L = \underset{}{-53476.9} + \underset{(104.17)}{0.783^{**}}\, D + \underset{(5.068)}{3887.3^{**}}\, Rd + \underset{(14.608)}{1.380^{**}}\, Fl$$

$R^2 = 0.999 \qquad DW = 2.47 \qquad S = 5569$

L = commercial bank credits
D = total deposits
Rd = interest rate on commercial bank credits
Fl = foreign liabilities of commercial banks

(26) GBb = 27634.0 + 0.151** D - 2010.9** Rd
(51.403) (7.283)

R^2 = 0.991 DW = 2.18 S = 3011

GBb = government bonds held by commercial banks
D = total deposits
Rd = interest rate on commercial bank credits

(27) Fa = 7407.3 + 0.056** D + 1033.2 (Ru-Rd)
(15.928) (1.905)

R^2 = 0.941 DW = 1.56 S = 3172

Fa = foreign assets
D = total deposits
Ru = interest rate on US's government bonds (mid-term)
Rd = interest rate on commercial bank credits

(28) CAb = 8718.7 + 0.032** D - 576.3 Rd + 89.7 Ru
(21.068) (1.926) (0.397)

R^2 = 0.950 DW = 1.50 S = 1521

CAb = cash and claim on BOT by commercial banks
D = total deposits
Rd = interest rate on commercial bank credits
Ru = interest rate on US's government bonds (mid-term)

Identities:

(29) B = Hb + Hg + Hf + Ho

B = monetary base
Hb = claims on commercial banks by BOT
Hg = claims on government by BOT
Hf = net foreign assets of BOT
Ho = other sources of base

(30) D = DD + TD + SD

D = total deposits
DD = demand deposits
TD = time deposits
SD = saving deposits

(31) CAp = B - CAb - OB

CAp = notes in circulation
B = monetary base
CAb = cash and claim on BOT by commercial banks
OB = other uses of base

(32) GBp = Z - TD - SD

GBp = government bonds held by private sector
Z = interest-yeild financial assets in private sector
TD = time deposits
SD = saving deposits

(33) Hb = L + GBb + Fa + CAb - D - Fl - OL

Hb = claims on commercial banks by BOT
L = commercial bank credits
GBb = government bonds held by commercial banks
Fa = foreign assets
CAb = cash and claim on BOT by commercial banks
D = total deposits
Fl = foreign liabilities
OL = other liabilitites of commercial banks

(34) X = Xa + Xi

X = aggregate merchandise exports (real)
Xa = export values of agricultural products (real)
Xi = export values of industrial products (real)

(35) XN = (Xa*Pxa) + (Xi*Pxi)

XN = aggregrate merchandise exports
Xa = export values of agricultural products (real)
Xi = export values of industrial products (real)
Pxa = export price index of agricultural products
Pxi = export price index of industrial products

(36) M = Ma + Mi + Mo

M = aggregate merchandise imports (real)
Ma = import values of agricultural products (real)
Mi = import values of industrial products (real)
Mo = import values of petroleum products (real)

(37) MN = (Ma*Pma) + (Mi*Pmi) + (Mo*Pmo)

MN = aggregate merchandise imports
Ma = import values of agricultural products (real)
Mi = import values of industrial products (real)
Mo = import values of petroleum products (real)
Pma = import price index of agricultural products
Pmi = import price index of industrial products
Pmo = import price index of petroleum products

(38) TBD = MN - XN

TBD = Trade deficits
MN = aggregate merchandise imports
MX = aggregate merchandise exports

(39) CAD = TBD + Ms - Xs - Tr

CAD = current account deficits
TBD = trade deficits
Xs = non-merchandised exports
Ms = non-merchandised imports
Tr = unrequited transfer from abroad

(40) A = Cp + Ip + (Cg/Pd) + (Ig/Pd)

A = domestic absorption
Cp = private consumption expenditures (real)
Ip = private capital formation expenditures (real)
Cg = public consumption expenditures
Ig = public capital formation
Pd = GDP deflator

(41) Y = A + X + (Xs/Pxs) - M - (Ms/Pms) + Dis

Y = gross domestic products (real)
A = domestic absorption
X = aggregate merchandise exports (real)
Xs = non-merchandised exports (real)
Pxs = export price index of other exports
M = aggregate merchandise imports (real)
Ms = non-merchandised imports (real)
Pms = import price index of other imports
Dis = discrepancies in national income identity (real)

(42) E = ln[(A+(XN/Pd))/(Qa+Qi+Qp)]

E = demand pressure variabl
A = domestic absorption
XN = aggregrate merchandise exports
Pd = GDP deflator
Qa = value added of agricultural products
Qi = value added of industrial products
Qp = value added of public utilities

(43) Dg = Cg + Ig - T

Dg = government budget deficits
Cg = public consumption expenditures
Ig = public capital formation
T = government tax revenues

(44) ΔBf = Dg - ΔGBp - ΔGBb - ΔHg - GSB + OG

Bf = stock of government's external debt
Dg = government deficits
GBp = government bonds held by private sector
GBb = government bonds held by commercial banks
Hg = claims on government by BOT
GSB = Government's borrowing from Government Savings Bank
OG = other financing of government deficits

(45) Pdh = exp[{ln(Pd)-0.2321*ln(Pda)-0.2989*ln(Pdi)}/(1-0.2321-0.2989)]

Pdh = domestic price index of public utilities and services
Pd = GDP deflator
Pda = domestic price index of agricultural products
Pdi = domestic price index of industrial products

Notes:

* indicates .05 significant level.
** indicates .01 significant level.
*** Durbin-h cannot be found but coefficient of e_{t-1} is not significant.

LHSV(-1) is lag of left-hand-side variable
S is a standard error of the regression.
DW is Durbin-Watson statistic.
Dh is Durbin-h statistic.
R^2 is adjusted R^2.

The figures in parentheses below the coefficients are absolute t values.

REGRESSION 1

REGRESS : dependent variable is D1
Using 1971 - 1988

Variable	Coefficient	Std Err	T-stat	Signf
^CONST	-16614.1	7481.73	-2.22063	0.045
PXM	-876.060	224.732	-3.89824	0.002
INF	1542.50	549.418	2.80751	0.015
PTN	-145.819	126.769	-1.15027	0.271
TY	-6420.84	1243.02	-5.16553	0.000

Equation Summary

No. of Observations =	18	R2= 0.6944 (adj)=	0.6003
Mean of Dep. Var. =	-1233.33	Std. Error of Reg.=	9962.48
Log(likelihood) =	-188.331	Durbin-Watson =	2.37615
Schwarz Criterion =	-195.556	F (4, 13) =	7.38360
Akaike Criterion =	-193.331	Significance =	0.002484

Definition of variables

D1 = Deviation from the base year of consolidated non-financial public sector deficits.
PXM = Deviation from the base year of term of trade (price of export/price of import).
INF = Deviation from the base year of inflation rate.
PTN = Deviation from the base year of real exchange rate (price of tradeable/price of nontradeable goods).
TY = Deviation from the base year of taxation rate (tax revenue/GDP).

Note: Base year is 1970.

REGRESSION 2

REGRESS : dependent variable is LNM1Y
Using 1972 - 1989

Variable	Coefficient	Std Err	T-stat	Signf
CONST	0.518219E-02	0.178207	0.290796E-01	0.977
INFLAT	-0.556681E-02	0.277235E-02	-2.00799	0.063
LNM1Y(-1)	0.988126	0.114658	8.61800	0.000

Equation Summary

No. of Obs. = 18	R2= 0.861 (adj)= 0.843	Durbins H= -0.18102	
Mean of Dep. Var. =	-1.11787	Std. Error of Reg. =	0.580007E-01
Log(likelihood) =	27.3511	Durbin-Watson =	2.13825
Schwarz Criterion =	23.0158	F (2, 15) =	16.5112
Akaike Criterion =	24.3514	Significance =	0.000000

REGRESSION 3

REGRESS : dependent variable is LNM2Y
Using 1972 - 1989

Variable	Coefficient	Std Err	T-stat	Signf
CONST	0.529000E-01	0.313410E-01	1.68788	0.112
INFLAT	-0.816418E-02	0.208719E-02	-3.91159	0.001
LNM2Y(-1)	0.913900	0.420864E-01	21.7149	0.000

Equation Summary

No. of Obs. = 18	R2= 0.981 (adj)= 0.979	Durbins H= 0.45919	
Mean of Dep. Var. =	-0.748667	Std. Error of Reg. =	0.479847E-01
Log(likelihood) =	30.7637	Durbin-Watson =	1.65561
Schwarz Criterion =	26.4282	F (2, 15) =	390.720
Akaike Criterion =	27.7637	Significance =	0.000000

Definition of variables

LNM1Y = Ln of money supply (M1) / GDP.
LNM2Y = Ln of money supply (M2) / GDP.
INFLAT = Inflation rate.

REGRESSION 4

REGRESS : dependent variable is ln(Cp)
Using 1971 1987

Variable	Coefficient	Std Err	T-stat	Signf
CONST	1.15471	0.513201	2.25001	0.051
ln(Y)	0.786174	0.104667	7.51116	0.000
ln(Rd)	-0.10227	0.505625E-01	-2.02272	0.074
ln(Ig/Cg)	0.225034E-01	0.632381E-01	0.341875	0.740
ln(M2-1)	0.974307E-01	0.767485E-01	1.27599	0.234
ln((Cg+Ig)/T)	-0.782962E-01	0.892175E-01	-0.877586	0.403
ln(GBp/Pd)	-0.146053E-01	0.169750E-01	-0.860396	0.412
ln(Pd)	-0.234148	0.104292	-2.24515	0.051

Equation Summary

No. of Observations =	17	R2= 0.9989	(adj)= 0.9980
Sum of Sq. Resid. =	0.161509E-02	Std. Error of Reg.=	0.133961E-01
Log(likelihood) =	54.6015	Durbin-Watson =	1.92511
Schwarz Criterion =	45.2686	F (7, 9) =	1163.72
Akaike Criterion =	46.6015	Significance =	0.000000

REGRESSION 5

REGRESS : dependent variable is ln(Ip)
Using 1971 1987

Variable	Coefficient	Std Err	T-stat	Signf
CONST	-1.84048	0.938922	-1.96020	0.078
ln(Y)	1.50444	0.935558	1.60807	0.139
ln(Rd)	0.259597	0.190656	1.36160	0.203
ln(Ig/Cg)	0.573098	0.268775	2.13226	0.059
ln(Kp)	0.982066	0.737256E-01	13.3206	0.000
ln((Cg+Ig)/T)	-1.14782	0.380600	-3.01582	0.013
ln(Pd)	-0.303517	0.436194	-0.695830	0.502

Equation Summary

No. of Observations =	17	R2= 0.9729	(adj)= 0.9567
Sum of Sq. Resid. =	0.366257E-01	Std. Error of Reg.=	0.605191E-01
Log(likelihood) =	28.0699	Durbin-Watson =	2.10023
Schwarz Criterion =	18.1537	F (6, 10) =	59.8930
Akaike Criterion =	21.0699	Significance =	0.000000

where Cp = private consumption expenditures (real)
Y = gross domestic product (real)
Rd = interest rate on commercial credit
Ig = public capital formation (real)
Cg = public consumption expenditures (real)
M2 = money supply (real)
Pd = GDP deflator
T = government tax revenues
GBp = government bonds held by private sector
Ip = private capital formation (real)
Kp = private capital stock (real)

REGRESSION 6

REGRESS : dependent variable is ln(PTN)
Using 1971 - 1988

Variable	Coefficient	Std Err	T-stat	Signf
CONST	2.22830	0.921091	2.41985	0.032
ln(PXM)	0.217851	0.621260E-01	3.50953	0.003
ln(GR)	-0.343830	0.132596	-2.59306	0.024
ln(MX)	-0.115586	0.135087	-0.855638	0.414
ln(IGCG)	0.350566	0.139170	2.51898	0.027
ln(PTN(-1))	0.745844	0.144516	5.16098	0.000

Equation Summary

No. of Obs. = 18 R2= 0.866 (adj)= 0.811 Durbins H= -0.7971E
Mean of Dep. Var. = 5.76661 Std. Error of Reg.= 0.399157E-01
Log(likelihood) = 36.0725 Durbin-Watson = 2.02010
Schwarz Criterion = 27.4011 F (5, 12) = 15.5558
Akaike Criterion = 30.0725 Significance = 0.000070

REGRESSION 7

REGRESS : dependent variable is ln(MX)
Using 1970 - 1988

Variable	Coefficient	Std Err	T-stat	Signf
CONST	4.82361	3.01049	1.58616	0.137
ln(PXN)	-0.104528	0.254858	-0.410111	0.688
ln(PMN)	0.374427	0.267101	1.40180	0.184
ln(GR)	-0.424423	0.313888	-1.35215	0.199
ln(IGCG)	0.588447	0.219950	2.35426	0.035
ln(Y)	-0.306168	0.116400	-2.09131	0.057

Equation Summary

No. of Observations = 19 R2= 0.5154 (adj)= 0.3290
Mean of Dep. Var. = 0.145811 Std. Error of Reg.= 0.846375E-01
Log(likelihood) = 23.5635 Durbin-Watson = 1.87012
Schwarz Criterion = 14.7302 F (5, 13) = 2.76539
Akaike Criterion = 17.5635 Significance = 0.061767

where MX = import value/export value.
PXN = import price/export price.
PMN = import price/price of nontradeable goods.
GR = government expenditure/government revenue.
IGCG = government investment/government consumption.
Y = real GDP.
PTN = price of tradeable/price of nontradeable goods.
PXM = price of export/price of import.

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